FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

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Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list :—

1931

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Oct. 17. Football. R.A.F. *v.* Oxford University at High Wycombe.
Oct. 21. Rugby. Combined Services *v.* The Rest, at Woolwich.
Oct. 27. "By Air to Baghdad." Lecture by Mrs. Pender Chalmers at the Electrical Association for Women, 15, Savoy St., Strand, W.C.2 (3 p.m.).
Oct. 28. Football. R.A.F. *v.* Hampshire, at Bournemouth.
Oct. 29. "Accidents in Civil Aviation," Lecture by Capt. A. G. Lamplugh before R.Ae.S.
Oct. 31. Rugby. Combined Services *v.* Bristol, at Bristol.
Nov. 5. "Safety in Spinning," Lecture by H. B. Irving before R.Ae.S.
Nov. 18. "Flying Boats in Empire Defence," Lecture by Wing-Com. R. M. Bayley, before R.U.S.I.
Nov. 19. "Aircraft Vibration," Lecture by H. Constant before R.Ae.S.
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Dec. 10. "Air Flow—Demonstrations on the Screen by Means of Smoke," Lecture by W. S. Farren before R.Ae.S.
Dec. 17. "Control Beyond the Stall," Lecture by Dr. G. V. Lachmann before R.Ae.S.

1932

Jan. 14. "Interference," Lecture by E. Ower before R.Ae.S.
Jan. 28. "Effect of Height on Range," Lecture by A. E. Woodward-Nutt and Flt.-Lt. A. F. C. Scroggs before R.Ae.S.
Feb. 24. "A Flight to Abyssinia," Lecture by Sqdn.-Ldr. J. L. Vachell, before R.U.S.I.
Mar. 10. "Results with the New Wind Tunnel at N.P.L.," Lecture by E. F. Relf before R.Ae.S.
Mar. 16. "Development of Naval Air Work," Lecture by Commodore N. F. Laurence, before R.U.S.I.
Mar. 23. "High-Speed Flying," Lecture by Sqd.-Ldr. A. H. Orlebar, before R.U.S.I.
Apl. 13. "The North-West Frontier of India," Lecture by Maj.-Gen. S. F. Muspratt, before R.U.S.I.

EDITORIAL COMMENT

THOSE who turn the pages of their morning and evening papers with an eye ever on the lookout for the words "air" and "flying" have often of late been caught by the headline "Flying Squad" and started to read what they hoped would prove some new development of aeronautics. With something like disappointment they have found that the words only refer to the equipping of police constables with motor vehicles to deal with the blackguards of the road. Now, however, there is to be a new and real connection between the constabulary and the air, insomuch as Lord Byng has been succeeded by Marshal of the Royal Air Force Lord Trenchard as Commissioner of Metropolitan Police.

The Air "Cop"

It will not be easy for any man to follow Lord Byng. He has done great work at a critical time. Still, it would not have been easy to find a more suitable successor to him than Lord Trenchard. He is a very strong man, which is one essential for the post. He is also a man who has the gift of enlisting the almost idolatrous admiration of those who serve under him. His words of praise are treasured, and his censure is feared. Men go cheerfully on a forlorn hope at his bidding. There are very few constables in the Metropolitan Police who are not all that they should be. If any such remain, they may well tremble in their regulation boots if knowledge of their shortcomings ever reaches the ears of Lord Trenchard.

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We are very glad to hear that Kingsford Smith has been forbidden by his doctor to fly for some time to come. He is one of the very tough breed, like his fellow-Queenslander Bert Hinkler, and he has been accustomed to make very light of maladies which ordinary mortals think pretty incapacitating. Just before he started on his record flight in "Southern Cross Junior" he had an attack of influenza, which delayed him for a day or two. Some men suffer from the effects of "'flu" for weeks, but a very few days' rest enabled Kingsford Smith to start on an amazing test of endurance. On his last flight he

Kingsford Smith

suffered from the sun. Probably he took liberties with it. The sun in Eastern parts is no respecter of persons, and even the strongest must have regard for it or take the consequences. Kingsford Smith thought that he could defy them. He is a man who takes no risk with his equipment on a long flight. His conquest of the Pacific was due quite as much to his forethought in providing the best possible wireless equipment and a sound navigator, as well as to his practice in flying by instruments, as to his ordinary skill as a pilot. Mr. Anthony Fokker considers Kingsford Smith the greatest of the long-distance pilots. His meticulous care over his equipment, however, is not equalled by his care for himself. His physical powers are marvellous, but even they have a limit. We cannot spare a pilot like Kingsford Smith, and so we are glad that his doctor has insisted on his taking some reasonable care of himself.

We cannot help wondering what spirit of unrest urged him to undertake this last attempt to make still faster time between England and Australia. At the time of his marriage last December he is reported to have said that he had done with long-distance flying. At that time, however, his company, Australian National Airways Limited, was doing very well with its unsubsidised services between Brisbane, Sydney and Melbourne. Now it has suspended operations, and Kingsford Smith was without an occupation. Inaction must be intensely galling to a man like him. But this record-breaking between England and Australia has now been overdone. What lessons it had to teach have now been taught. We all know that an organised service could carry mails between the two countries faster than any one pilot in a light aeroplane with a single engine can possibly cover the distance. It may be that to keep on repeating the lesson will produce some effect; but, after all, special mail aeroplanes are now being produced, and the matter is not being allowed to stand still. That being so, the lives and the health of our best pilots are more valuable than any improvement on the latest light aeroplane performance can possibly be.

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Our Champions

The very pleasant gathering at Derby last Saturday, which is described in another column, was possibly the last occasion on which the members of the High-Speed Flight could be gathered together. We may take this opportunity of congratulating Flight-Lieutenants Boothman and Stainforth on having been granted the Air Force Cross by H.M. the King. Both officers have well deserved it, though we cannot help feeling that the two other pilots of the Flight were equally deserving. Doubtless the whole team realises that it is collectively honoured by the awards given to the two chosen champions, even as a regiment which has done well on active service is honoured by a decoration conferred on the commanding officer. The congratulations of the King were addressed to the whole Flight, and all members of it, including the warrant officers, non-commissioned officers, and aircraftmen, may plume themselves on having deserved the thanks of His Majesty.

The Flight is now on leave, and it gathered at Derby from various points of the compass. When the well-deserved leave is over, the members of the Flight will be scattered and will take up other duties. Martlesham, Felixstowe, Farnborough, will all gain pilots who, already among the best, have now benefited by a very special course of training in which scientific study is combined with practice in high-speed flying. One officer, Flight-Lieutenant Long, goes to join No. 8 (Bomber) Squadron at Aden. He will there fly Fairey III F two-seaters over the desert and play his part in one of the most interesting tasks entrusted to the Royal Air Force. It seems strange to us that officers who have displayed a peculiar degree of skill such as would mark them out as especially suitable for posting to fighter squadrons should in many cases be sent off to bomber squadrons. Naturally bomber squadrons need very good pilots. Their work is not in the least to be depreciated by comparison with that of fighter squadrons, and in many ways it may be held to be the more important work of the two. But it is usually held that fighter aeroplanes call for special qualities in a pilot which are not so necessary for two-seater aeroplanes, and that being so, it appears rather wasteful to put our Derby jockeys on to ordinary mounts.

The authorities of the Royal Air Force appear to be opposed to specialisation by pilots. The idea seems to be that as many pilots as practicable should practise flying as many types of aeroplane as possible. We find it hard to believe that this idea is sound. This is an age of specialisation, and the tendency to specialise tends to grow with the advance of science. As the Air Force expands, and as machines are further developed, it seems clear that specialisation will be more than ever necessary. Take the case of flying-boat pilots. They need a lot of experience before they become masters of their particular work. Mostly, we believe, they become enthusiasts on that work, and when they have mastered it and have become wedded to it they would gladly make it the work of their lives. Yet they too are liable to be moved to other squadrons, where their laboriously acquired experience and skill is wasted, and must gradually rust from want of practice. It seems to us bad policy. It certainly means some waste, and waste should be anathema to all services. The more experienced the pilot who flies a certain type of aircraft, the less likelihood there is of accident. One would have thought that the loss of an "Iris" with a number of valuable lives some months ago would have been a fairly emphatic lesson on the wisdom of conserving and utilising experience whenever possible, instead of dissipating it. Of course, even the expert has had to learn at some time; but the less learning that is going on, the less is the danger of a crash. To keep experts on the class of aeroplane for which they have shown special aptitude would seem an ordinary commonsense precaution. The only objection which we can see to such a policy would be that fighter pilots would never see any overseas service. Exceptions, of course, would have to be made; but, then, all pilots now flying fighters are not actually experts. The real experts, we consider, when they are doing squadron duty, should be kept to their own proper class of aeroplane.

Two New Military Aircraft

COMING from the Coventry factory at the Whitley Abbey aerodrome of the Sir W. G. Armstrong-Whitworth Aircraft Co., Ltd., the new Atlas II and the A.W.XVI are bound to be of interest.

The former is a new version of the well tried Atlas which has been used for so many years in our own Royal Air Force. The latter is an even more redesigned version of one of our foremost single-seater fighters, the "Siskin." Both have been described fully in FLIGHT at various times, and it will only be necessary now to deal with the major points of difference to the older versions.

DIMENSIONS OF THE A.W.XVI AIRCRAFT

Span	33 ft.	(10,06 m.)
Overall length ..	25 ft.	(7,26 m.)
Height	11 ft. 6 in.	(3,50 m.)
Top chord	5 ft.	(1,52 m.)
Bottom chord ..	4 ft. 3 in.	(1,29 m.)
Gap (mean) ..	4 ft. 11·2 in.	(1,51 m.)
Area of main planes	261 sq. ft.	(24,25 m².)
Tail plane area (total)	31·9 sq. ft.	(2,89 m².)
Elevator area ..	15·1 sq. ft.	(1,40 m².)
Rudder area ..	11·1 sq. ft.	(1,03 m².)
Fin area	4·43 sq. ft.	(0,41 m².)

The A.W.XVI Single-Seater Fighter

Described by the makers as "the fastest air-cooled single-seater fighter in the world," the A.W.XVI is quite noticeably a great improvement over the "Siskin" from which it originated.

This new aircraft has been cleaned cleaner than any Armstrong-Whitworth aircraft we have seen, resulting in a machine which not only has a really fine performance, but also looks the part. The first things which catch the eye are the cleanliness of such parts as the undercarriage and tail units, while the absence of excrescences is of note. As in the Atlas II, although we imagine it is really the lessons learnt in A.W.XVI which have been applied with such good effect to the Atlas II and not *vice versa*, the electrical generators and navigation lights are now fitted in such a manner that they cause practically no drag at all.

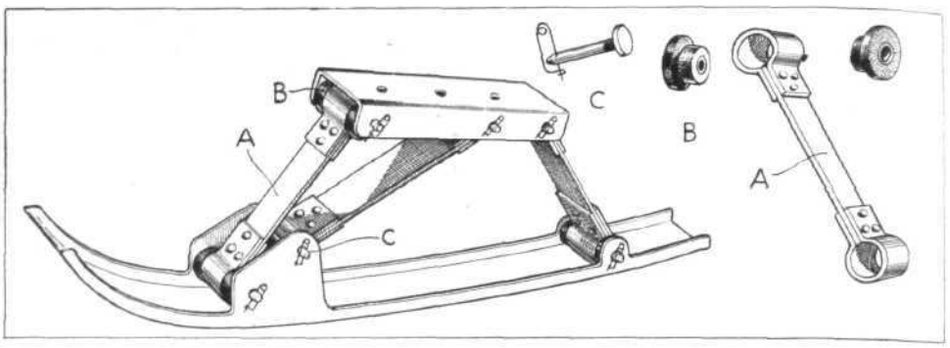
It is a single-bay biplane with steel strut interplane bracing of streamline section. The air-cooled engine, an Armstrong-Siddeley Jaguar Major, geared and supercharged, of 525 h.p., is cowled with a Townend ring fitted on flexible brackets. The fuel feed is by gravity from a tank in the fuselage having a capacity of 60 gall. and situated in the first bay behind the engine mounting. The engine bay is faired in by detachable panels, giving very easy access to such parts as the magnetos, fuel filters, oil-tank filter, etc. The first bay behind the engine is, as is usual, the one which contains the fuel tank. It also has below it the oil tank with a dome on it to obviate any possibility of oil frothing troubles in hot climates. Below this tank is the Vickers-Potts oil cooler, projecting into the slipstream underneath the machine. Abaft and above the oil tank is the mounting for the two high-pressure oxygen bottles, and abaft them again come the chutes for the used cartridges from the two Vickers guns situated in the top part of this bay and directly in front of the pilot. These guns fire straight ahead through two grooves in the decking just over the top of the engine cowling, and, being in this position, are excellently arranged to hand, for the pilot to clear a jamb should this be necessary. Behind the pilot's cockpit is the wireless equipment. This is mounted on a tray in the upper part of the tail fairway, which may slide out complete when required for adjustment or renewal.

The fuselage is of the standard steel tube type, with tie-rod and ball-ended vertical steel strut bracing, and is faired for the most part with aluminium panels which are easily detached.

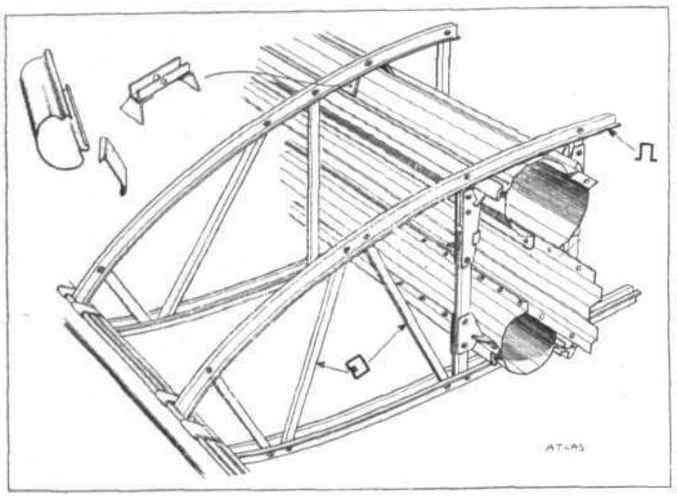
The pilot's cockpit is large and comfortable, as befits a machine which has to be used for high-altitude fighting. It would be impossible in an article of this size to describe all the controls and fittings in this cockpit, and it must suffice to say that everything which a pilot of a single-seater fighter must have to hand is thus arranged

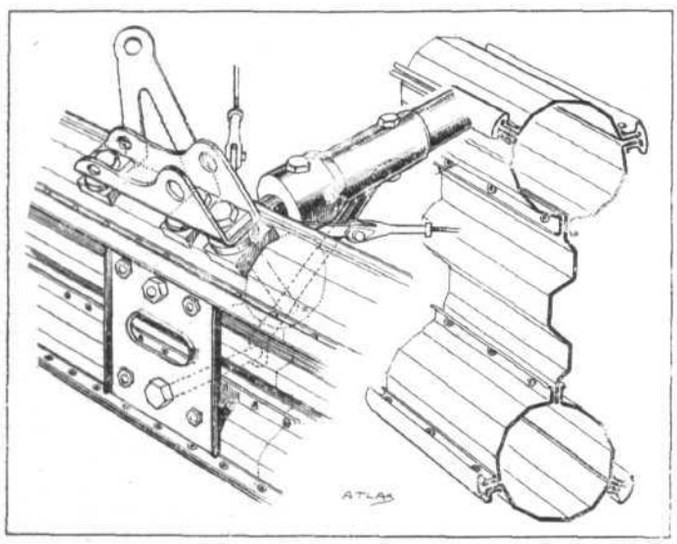
THE A.W.XVI: The well faired undercarriage and the efficient Townend ring engine cowling are particularly noticeable in this view. (FLIGHT *Photo.*)

The new brackets for holding on the Townend ring are shown on the right. The steel links A are flexible while the bushes B are of rubber and the pins C are a loose fit. The resulting flexibility has obviated cracking of the ring.



Below is a typical A.W. spar and rib assembly as used in the Atlas II.





Above the Atlas II strip steel spar is shown in greater detail while the method of building up a joint at the point where a drag strut and interplane strut meet is clearly depicted.

PERFORMANCE OF THE A.W.XVI AIRCRAFT

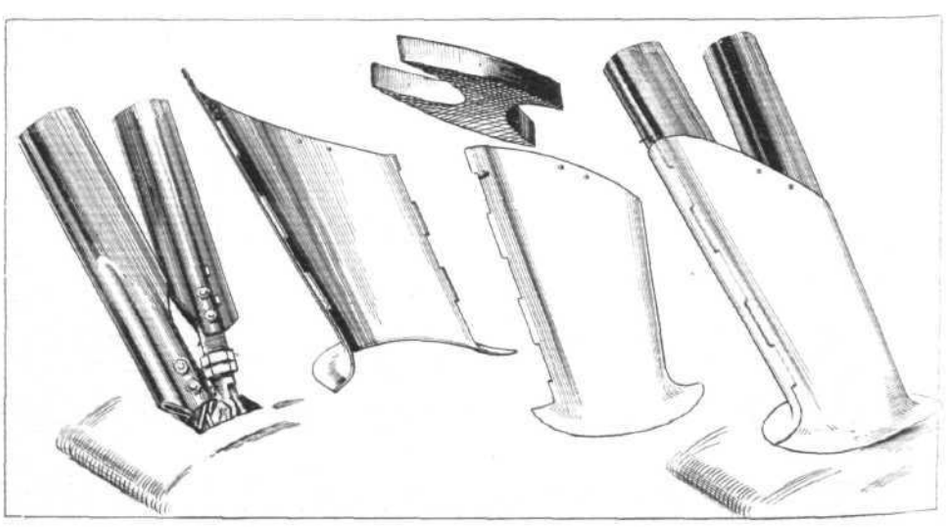
Fuel, 60 gall. (272,76 l.). Oil, 6½ gall. (29,55 l.) Military load, 530 lb. (240,4 kg.).

	With Jaguar Major Engine (with Townend Ring).	
	Geared Fan.	*Supercharged and Geared.*
Approx. total weight, lb. ..	3,600	3,600
Speed at :		
Ground level, m.p.h. ..	(180)	—
5,000 *ft.*	185	—
10,000 ,, ...	182	(203)
15,000 ,, ...	177	200
20,000 ,, ...	—	195
25,000 ,, ...	—	187
Time to :		
5,000 *ft.* *min.*	2·75	—
10,000 ,, ...	6·25	6·0
15,000 ,, ...	11·0	9·5
20,000 ,, ...	—	14·25
Absolute ceiling (ft.)	26,500	31,000
Service ceiling (ft.)	25,100	29,800
Approx. total weight, kg. ..	1 636	1 636
Speed at :		
Ground level, km.p.h. ..	(290)	—
1 000 *m.*	300	—
3 000 ,, ...	293	327
5 000 ,, ...	281	320
6 000 ,, ...	—	315
8 000 ,, ...	—	295
Time to :		
1 000 *m.* *min.*	1·75	—
3 000 ,, ...	6·25	6·0
5 000 ,, ...	12·8	10·5
6 000 ,, ...	—	13·75
Absolute ceiling (m.)	8 080	9 450
Service ceiling (m.)	7 650	9 080

Speeds in brackets imply that the engine is throttled. The rated altitude for the supercharged Jaguar Major is 12,000 ft. (3 655 m.).

Endurance: Jaguar Major II (geared fan) at 3,000 ft. (914 m.), cruising speed 155 m.p.h. (248 km.p.h.), range 345 miles (522 km.).

With Jaguar Major III (supercharged), at 12,000 ft. (3 655 m.), cruising speed 170 m.p.h. (272 km.p.h.), range 370 miles (592 km.).



On the right the neat interplane strut end fairings and their method of assembly are shown.

FLIGHT *Sketches.*

In spite of its high powered radial air-cooled engine the A.W.XVI looks very clean, even for a single-seater fighter. The height of the pilot's head shows that he had the seat in its top position when our photograph was taken. (FLIGHT *Photo.*)

THE ATLAS II: Such points as the new rudder shape, the built-in tail lamp, the neat "slots," and general cleanliness make it immediately apparent as to where this efficient two-seater gets its performance. (FLIGHT *Photo.*)

and in a particularly convenient manner. The wheel brakes are independently operated by toe pedals pivoting around the ends of the rudder bar; it is not necessary, therefore, to remove the feet from the bar when using the brakes. The rudder bar itself has a very simple adjustment which allows for a wide variation in pilots' leg-length, and this can be made use of in flight. The adjustable seat is controlled by a lever on the right-hand side, and is of the "push-to-raise" type. Being spring loaded —with rubber shock absorber cord—practically no force is required to put the pilot in the highest position. The undercarriage has, of course, to carry the strain of braking, and the radius rods are therefore extremely strong. They are of the built-up type with internal stiffeners, and are in the form of streamline tubes. The axle is a plain steel tube faired to a streamline shape with aluminium. The wheels are faired with "spats," which, together with strut-end fairings, give the whole undercarriage a very clean appearance. The oleo-cum-rubber compression legs are of the same type as those used on the Atlas II.

A light bomb rack is fitted under the bottom port main plane, and this, together with the two Vickers guns, forms the total offensive armament.

The main planes, rigged in single-bay biplane form, are of Clark YH section, and constructed throughout of steel with a fabric covering. The outer incidence bracing is rigid, being streamline steel struts in the form of a N. The ends of these struts, as also those of the interplane struts and the wing roots, are carefully faired in with aluminium fairings, giving the wing cellule a very clean form. The planes themselves have built-up steel strip spars with bulbous booms and a corrugated web. The drag bracing is of steel tubes and cross wires. The ribs are of strip steel drawn to the requisite channel or tubular section, while the covering is of doped fabric.

The ailerons, which are Frise balanced, have a plain tube spar with similar ribs to the main planes. The leading edge is a sheet of duralumin and forms the balance. The hinge points, which are set back behind the spar, are of the ball-bearing type, and are three in number. The trailing edge of the top ailerons has a small movable flap built in it to allow of final balancing after the aircraft is rigged. Both ailerons are statically balanced by virtue of placing the hinges behind the spars, the weight of which, together with the streamline steel strut connecting the two ailerons, is sufficient to balance the trailing portion of the aileron.

The rudder and elevators are both horn balanced, and the elevator has a metal plate attached to the horn which ensures static balance as well. The rudder has a plain tubular post with drawn strip steel ribs, and, in a similar manner to the top ailerons, has the movable flap for final balancing. The elevators are built in two pieces with the steel tube spars joined at the centre, at which point duplicate levers are attached to the operating rod.

The tailplane is very rigid, with a spar somewhat like the main plane spars. The drag bracing is also of this spar section, and, being in the form of a Warren girder supplemented by tubes at the centre, provides a tailplane which is proof against distortion. In the A.W.XVI the nose ribs are of duralumin, but the main ribs follow the same construction as those in the wings and are of steel.

The tail skid is more or less conventional, and is sprung with a steel coil spring of ample dimensions.

In the air the A.W.XVI is very impressive indeed. The slow-running airscrew makes the machine particularly silent, especially when flying slowly, as she can do, and yet still be under perfect control. At high speed and at high angles of climb she shows to equal advantage, and leaves one in no doubt of her efficiency in the air. In spite of her excellent top speed and climb, her landing speed is low, and the run on landing, even without using the brakes, as short as could be wished for.

(To be concluded.)

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Lord Trenchard

THE following official announcement was made on October 8:—The King has been pleased to approve the recommendation of the Home Secretary that Marshal of the Royal Air Force Lord Trenchard, G.C.B., D.S.O., be appointed Commissioner of the Police of the Metropolis, in succession to General Viscount Byng of Vimy, G.C.B., G.C.M.G., M.V.O.

Honour for Schneider Pilots

THE KING has approved the award of the Air Force Cross to the following officers of the Royal Air Force:—Flt. Lt. J. N. Boothman, in recognition of his achievement in winning the Schneider Trophy Contest, 1931; and Flt. Lt. G. H. Stainforth, in recognition of his flights with the High-Speed Flight of the Royal Air Force in connection with the Schneider Trophy Contest, 1931, culminating in the establishment of a world's speed record on September 29.

An R.101 Echo

THE KING has conferred the M.B.E. on Mr. George Darling, a young Englishman connected with the well-known family of racehorse owners, who dragged two members of the crew of R.101 clear of the burning wreckage and took them to hospital in his car. The decoration was presented to Mr. Darling on October 9 by Lord Tyrrell, British Ambassador in Paris.

Japanese Bombing in China

IN the course of the Japanese occupation of Manchuria, it is reported that Japanese aeroplanes have bombed and wrecked the railway junction of Taonan. Bombs are also reported to have been dropped on Chinchow, on the Peking-Mukden railway, and on another railway station at Tahushan. Accurate reports of the casualties inflicted have not been received.

Meeting a Demand

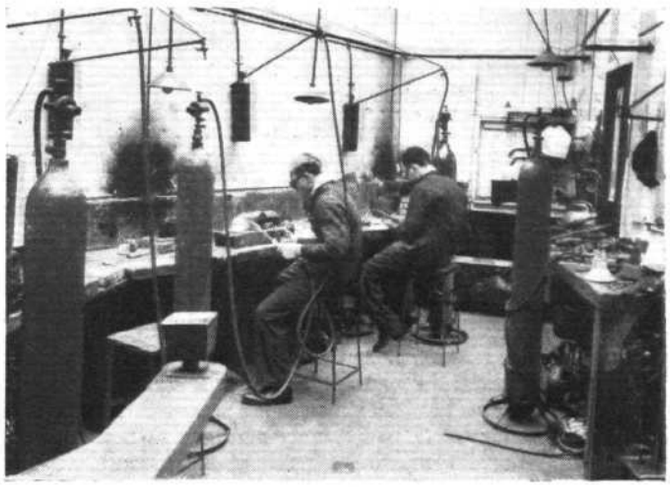
The College of Aeronautical Engineering started its first term on October 7 with a full complement of students

IN spite of the pessimists who just sit on their haunches and moan about bad trade and their inability to sell their goods—in spite of those who still seem to think that the way to sell things is to sit down and whistle for customers to come to them—in spite of all these and many more such hindrances, the aircraft business is growing. Growing slowly, but surely, and the volume of our export trade in both aircraft and engines is steadily becoming a matter of some importance.

This growth means that more men will be absorbed into the trade, and so the chance for the properly trained man will become better and better. Unfortunately, it has to date, been comparatively hard for young men to obtain the right training before entering a manufacturer's works, but now, with the establishment of the College of Aeronautical Engineering at Sydney Street, opposite Chelsea Town Hall, those who wish to get a very good grounding in general engineering and become sufficiently advanced in aeronautical engineering to obtain their Ground Engineer's Licences "A" and "B," will have no difficulty in doing so. Thus equipped, they should far better be able to fill administrative positions than those who lack such a training.

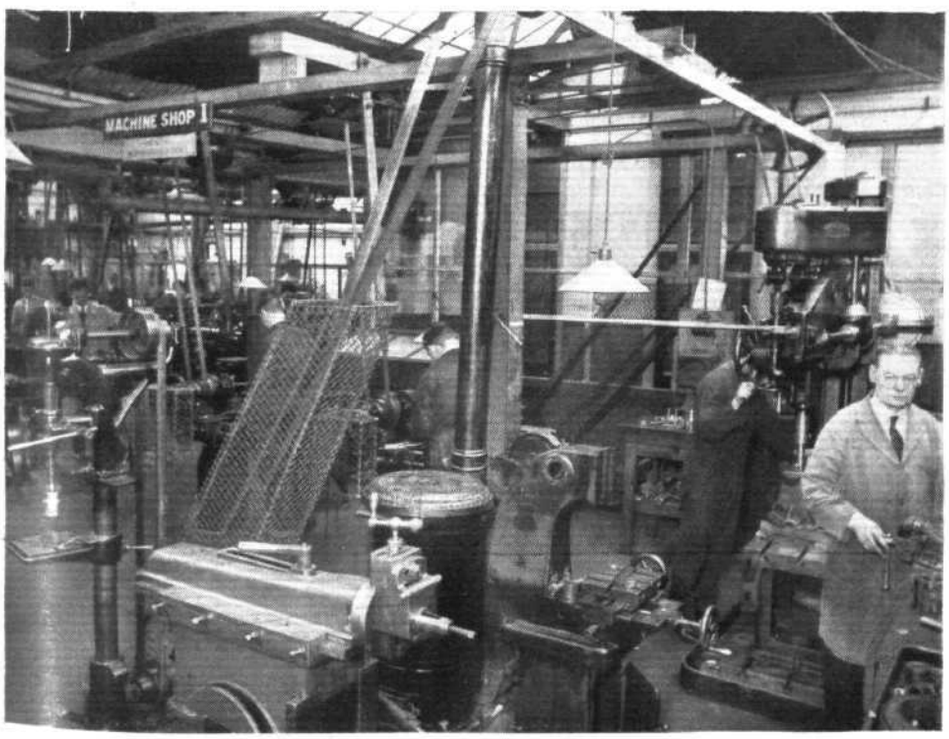
The College of Aeronautical Engineering sets a new standard altogether. It is closely allied in this enterprise with the Brooklands School of Flying, and it is at this latter place that the students will obtain their practical aviation training.

A visit to the College shows the care and forethought with which the whole curriculum has been laid out. Right from the beginning the students have inculcated upon them the necessity for hard and studious application to what is being taught them, and they have little opportunity for simply "scraping through." The course as laid out is very comprehensive, and covers every field likely to be of use to those holding positions of authority in aviation. It is, however, not suggested that on leaving the College students will immediately be able to command high wages at some job about which they have little practical knowledge; far from it, but it is affirmed, and rightly so I think, that those who have passed creditably through the whole of the aeronautical course should become of real value to their employers far sooner than those who have not done so.



THE WELDING SHOP: In this shop the students are taught oxy-acetylene welding of both steel and aluminium. (FLIGHT *Photo.*)

Instruction is given, not only in general engineering practice, but also in aero engine overhaul and maintenance, air navigation and meteorology, wireless, light and signals, aerodrome organisation, aviation law, theory of flight and aeroplane design. In fact, every matter of engineering appertaining to aircraft is dealt with. The course includes everything which is necessary to obtain the Ground Engineer's Licences "A" and "C," though naturally these can only be obtained after due examination by Air Ministry officials. The "B" licence can also be obtained after sufficient time has been spent in the workshops of an aircraft manufacturer.



THE MACHINE SHOP: Cylinder grinding, shaping and milling machines are employed in this shop. All the work is done as part of a carefully thought course of instruction and nothing is left to the pupil to do as he may think fit. (FLIGHT *Photo.*)

The College is run as a college, and the students have to conform to rules exactly as they would have to do in any other college. They must not be less than 17 years of age, and must have a certain definite standard of education. From what I saw, I should say that the type under instruction is just the sort required. They were all keen looking, and of the kind who gave one the impression that they were out to prove their worth. It was interesting to hear that, although the College only started its first term on Wednesday, October 7, yet the course is already quite full, and, indeed, more than double the numbers it is possible to take, have applied to join. Students have come from America, South Africa and India, so there is little doubt that the College is filling an existing want.

The College has been started jointly by the Automobile Engineering College and the Brooklands School of Flying. The former has had many years' experience of turning out young engineers who know all about motor-cars, and they are therefore well qualified to undertake the instruction of students in

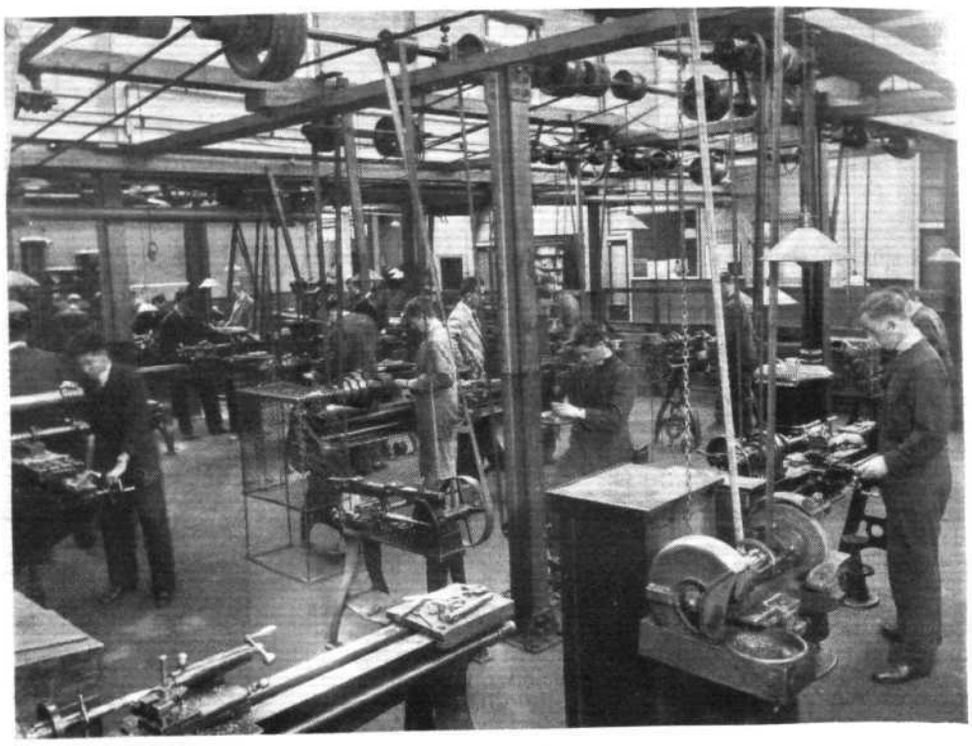
aeronautical engineering, but linked as they are with one of the oldest and best-known flying schools in the country, their position is even further strengthened. At Brooklands they have everything which the seeker after aviation knowledge can desire. Mr. Ted Jones has been kept busy on navigation lectures for a long time past now, and this association with the Engineering College will, we imagine, keep him even busier; he is, however, of the type who thrives on hard work, and he is never too busy to explain to knowledge-seeking students the why and wherefore of quadrantal error or some similar problem.

The advisory council of the College is one which shows that the scheme is no dilatory one; it consists of:—Sir Alliot V. Roe, Lt. Col. J. T. C. Moore-Brabazon, Mr. F. Sigrist, Mr. H. J. Thomas and Mr. M. Desoutter, while the Administrative and technical board has on it:—Mr. C. H. Roberts, the Principal of the College; Capt. Duncan Davis and Mr. E. A. Jones, both of Brooklands Aviation, Ltd.; Mr. Percy Bradley, Manager of Brooklands Track; and Mr. G. D. Duguid, the Chief Technical Engineer of the College. A more representative and capable set of men it would be difficult to find, so there is no likelihood of the College failing through lack of adequate and well-informed advice.

At the present time the majority of the shops at 102, Stanley Street, Chelsea, S.W.3, are, of course, occupied by students who are learning to become automobile engineers, and naturally the two courses can, very largely, be run concurrently. One shop has, however, been turned over entirely to aviation, and that is the aero-engine shop. In here are found specimens of many different kinds of aero engines, and Mr. Roberts told me that he was obtaining at least one of every type which is likely to be met with. These engines are mounted on swivelling beds, so that the small parties of students, assigned to each, are able to dismantle their respective engines completely, rebuild them, and in some cases transport them to Brooklands, to be run up and tested out on the bench. The shops as a whole are all well fitted, have adequate machinery, ventilation and light. All students are supplied with a set of tools, which they have to look after themselves, as well as keeping clean the machines they may work on.

Many of the pupils are accommodated at the College House. This is a large building on the side of Wimbledon Common, and is run as an adjunct to the College. Here a resident Warden is in charge, while a Matron supervises all the domestic details. There are common rooms, guest rooms, and games rooms, while the bedrooms are particularly large and airy. The College House is divided into three houses, each with its own House Captain, and these, under a Senior House Captain, form a committee which has the power to put forward suggestions as to the running of the College House.

An interesting and informative brochure has been prepared, which will be sent to anyone who is thinking of having their boy trained at the College. If those boys then go with the intention of learning all they can, there is no doubt that they will in the end leave and pass out into the world well equipped to take up any of a wide range of jobs in aviation.



MORE OF THE MACHINE SHOP: All the ordinary machine tools are here available and the students have to go through a course incorporating work on each one of them. They are thus taught accurate and fine work under careful supervision. (FLIGHT *Photo.*)

THE AIRCRAFT ENGINE SHOP: In this shop the embryo ground engineers are instructed in the art of pulling aircraft engines to pieces and then assembling them in such a way that they will work! Engines of all the best known types are to be found here as well as certain relics of Brooklands by-gone joy-riding triumphs. (FLIGHT *Photo.*)

The Home of "Castrol"

A short description of C. C. Wakefield & Co.'s plant at Hayes, Middlesex, from which all the Castrol brands of lubricating oils are supplied to the southern half of England

Illustrated with "Flight" sketches

AERO engines have not yet reached the stage when they may, with comparative safety, be treated, or, I ought to say, ill-treated, like the majority of motor-car engines. The subject of lubrication is one, therefore, about which even the most average pilot knows quite a lot. He does not stroll to the nearest filling station and ask for so many quarts of any old brand, but he specifies the oil he wants, and sees that he gets it. He knows that the correct functioning of his engine depends on him using its appropriative grade of lubricating oil—and that its incorrect functioning will sooner or later mean a forced landing ; and even in these "slotted" days one does not deliberately court forced landings. Hence, every pilot's care for his engine. But so particular are most pilots that they do not just stop at the requisite grade, they demand their own pet brand, and like the soapless baby they are not happy till they get it.

The brands of lubricating oil suitable for aircraft engines are many nowadays, but one of the best known, and certainly one that is very much used, is "Castrol."

This is made in every conceivable grade to suit all engines, and those most widely used in aircraft engines are Castrol XL, XXL and R. The latter is used in hot engines or for racing, but in most ordinary engines, such as, for example, the "Hermes" and "Gipsy," Castrol XXL is suitable even for this strenuous work.

With the idea of seeing how this oil came about, so to speak, I went to the Crown Wharf, at Hayes. I had no definite ideas on what I expected to see, but of one thing I am certain ; I did not expect these oil works to be other than "oily," that is, I assumed that I should get bespattered, and that probably the turn-ups of my trousers might look like piston skirts below the scraper rings. I need not have worried! it was more like a beauty parlour than an oil works, or whatever such a place is called. Why, in one shop I found a delicately scented oil being filled into tins, and the books sent out with this brand—called "Oilit"—recommended its use for such widely varying purposes as oiling the hinges of safes, polishing furniture, oiling artificial limbs and making the hair grow!

The cleanliness and care taken to ensure that all oil is free from any kind of impurity almost overawes one ; it almost seems unnatural.

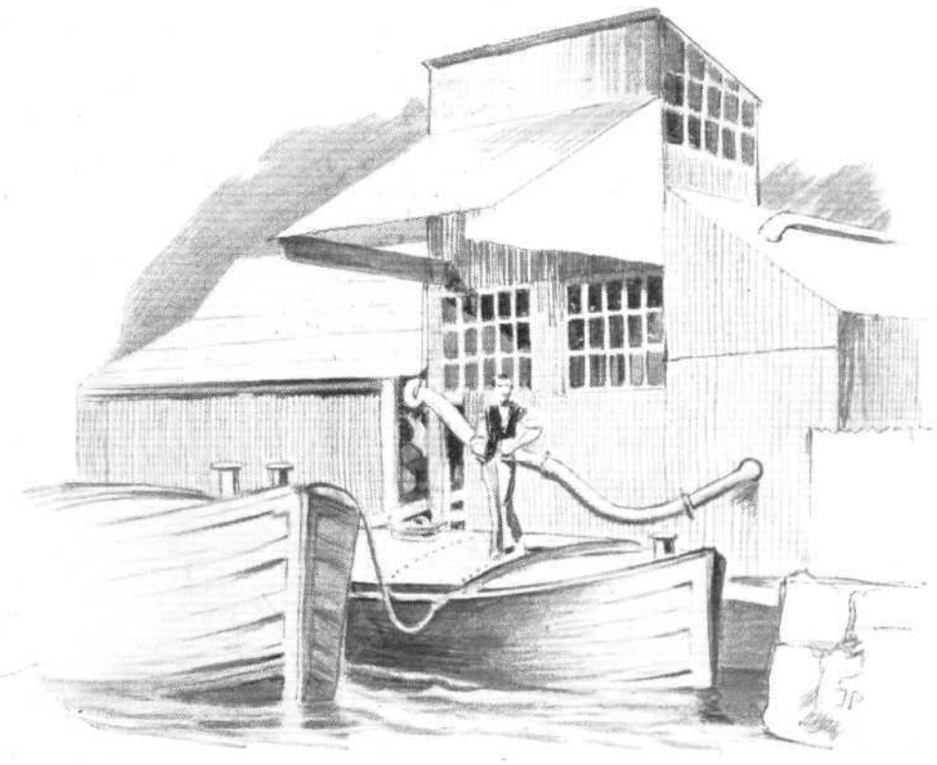
The works at Hayes are comparatively new, having only been established for some 5 years ; previous to that the whole output of Castrol had come from Liverpool, but the rising use of motors and other engines wanting lubrication caused Lord Wakefield to establish this depôt at Hayes.

It is in an admirable position, being on the Grand Junction Canal, a main line railway and close to a main road. Transport problems are thereby reduced to a minimum. Tankers of as large as 60 tons displacement can be filled in the Thames and then brought through the canal right alongside the works. This is the way in which nearly all the oil comes. Some of it is in bulk, and is then pumped into 4,000 gall. storage tanks by two pumps, each delivering 200 gall. per min.! while some is delivered in wooden barrels ; these are caught up by a grab and slung on to runways down which they travel to wherever they are to be stored, or else they are raised up to one of the five floors of the main storehouse. In either case they are weighed in, and their contents checked up.

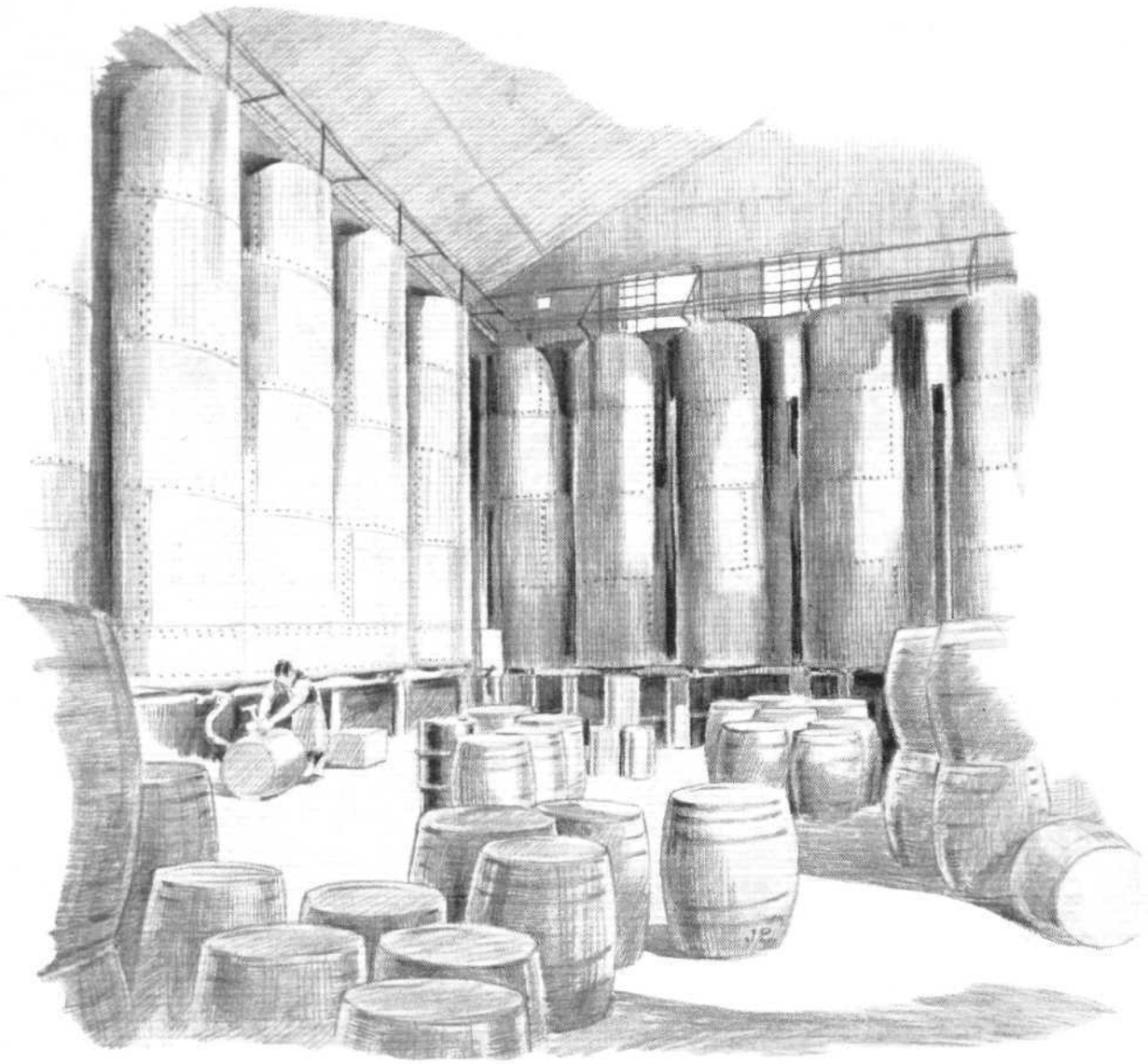
The top floor of this store is used as a service department, and here all the cabinets and garage pumps are returned for repainting when they have become damaged and dirty. All steel drums and wooden barrels used in the works—they seem to number thousands and thousands—go through many processes before they are refilled. They have to be washed out with hot oil or steam if they are at all dirty, then drained and examined by the aid of an electric lamp on a long handle, and finally painted outside and have the correct marking put on them.

About this time on our round I discovered that they have the excellent habit of giving everyone a cup of coffee. It was then 10.30 a.m., and, as I had made a very early start, this coffee was most acceptable. The men get a 10 min. break while they consume this beverage, and the extra work resulting from the renewed vigour is said to be very marked. The next thing I saw was a series of pits in which oil was bubbling and churning. These were the floor level blending tanks. A system of piping leads from the main storage tanks to these tanks, and each brew is concocted from various quantities of different oils pumped from these storage tanks. When a brew requires an oil which is in barrels, the requisite barrels are rolled on to a gutter opening into the blending in such a manner that they can be drained straight into it. It should be explained that the oil in the storage tanks is not a finished lubricating oil, for this has to be a blend different according to the use to which it is to be put.

Castrol brand lubricating oils are, for example, as their name implies, blends of various mineral oils with pure castor oil. It is this castor oil which has made the name of



OIL UPON THE WATERS: The bulk oil mostly comes in tankers to the Thames where it is transferred to these 60-ton barges and taken down the Grand Junction Canal to Hayes. Its peaceful journey comes to an end by being pumped at 200 gall./min. to the storage tanks in the building.



HIGH AND MIGHTY: The birthplace of the blended oils. These 12,000-gall. tanks are but a few of those in the blending room. Here the oil loses its non-entity and becomes a specific grade such as Castrol XL or XXL as the case may be. Our artist gives a fine impression of the way these tanks tower round the walls, from them the barrels and drums are filled with the finished article for delivery to the consumer all over the world.

Wakefield's famous all over the world. In the early history of the firm it was discovered that pure castor oil retained its lubricating properties under far higher temperatures and far harder working conditions than the mineral oils of those days. This was because the molecules of the castor oil have greater adhesive properties for metal surfaces than have the molecules of mineral oils, and the film of castor oil is thus harder to break down or displace than the mineral film. Unfortunately, the use of pure castor is attended, as many racing motorists and motor-cyclists know only too well, by several disadvantages, such as gumming up, making starting difficult. It was therefore tried as a blend with certain mineral oils, and was an instant success. Thus, to-day, we get what might, roughly speaking, be called a castor oil sandwich with mineral oil as the jam. The castor oil does its trade by retaining the whole in the bearing better than the mineral alone would do.

But to return to our blending tanks. Here, after the requisite proportions have been measured in, steam coils heat up the oil, and air jets at the bottom of the tank mix it. Next comes a test in the laboratory, and if everything is pronounced up to standard the mixture goes through a filter—the bulk tanks also had filters for the oil going in and out—into a large 12,000 gall. vertical cylindrical tank. There is a row of these tanks, standing like Colossii, round the wall, and the heating and mixing process is again carried on here. Once more comes the test in the laboratory, and then, if the sample is up to specification, it is passed as ready for delivery.

Now comes an interesting part of the proceedings to watch. Whether the oil is to be delivered in steel drums, wooden barrels or 1 gall. cans does not matter, the same thing happens; and that "thing" is a Roberts filling machine—it ought to be called a Robot filling machine.

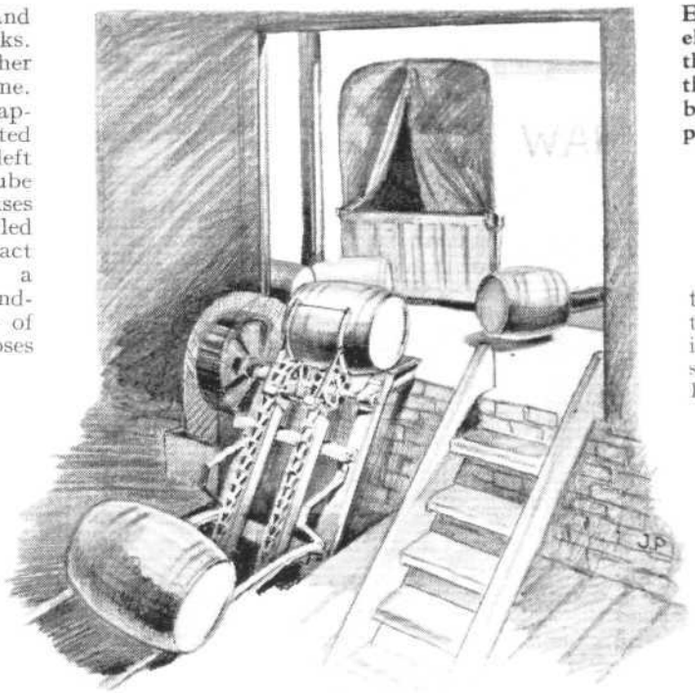
It consists of a weighing machine with a pipe led to the top of it, and finishing in an electrically controlled valve. The procedure is this: a barrel or drum is placed in position on the scales and a trigger pressed; a stream of oil immediately goes into the filling hole, and as soon as the correct weight is in that barrel or drum the valve shuts by electricity. It is then rolled or pulled off, and a new one filled. Whatever oil it is, or whatever size the barrel, the right weight shuts the valve. Alongside the machines are ordinary scales, and every so often the man in charge weighs a barrel as a test, just to check the filling machine—but it never really needs it.

These machines are in use in all sorts of different sizes throughout the works. I saw them being used for big drums and for 1-oz. bottles! The amazing part is the dropless stream which comes from the jet; the cut-off is clean and instantaneous; you will never see a drop of oil spilt while filling at Hayes!

Such is the tale of the lubricating oil. The last it sees of the works, assuming for the moment that it is a gallon can of XXL, is when a small boy, with a rapid twist of an instrument in his hand, secures and locks a "press-cap" on the opening. The cans are then wrapped in brown paper to preserve their pristine beauty, and packed in wooden boxes; these boxes are sealed up, and a fleet of lorries—also usually painted in Castrol green—take them to our aerodromes.

Many other kinds of oil and grease come from these works. There was, for instance, another machine which fascinated me. The boy grasped a large collapsible tube like an exaggerated toothpaste tube, firmly in the left hand by the screw top. This tube was open at what we ignoramuses call the bottom. Into it was filled grease as it came, just the exact quantity, squirting through a nozzle. A jab with the unoffending tube at the left-hand side of another machine slightly closes this end, and a moment's application to the centre of the machine completely closes it, rolls it over twice, and squashes it flat. Another jab and a metal clamping strip is jammed on the flat part; the tube is then ready for you to empty by "squeezing from the end!"

One fact, about which all hands are proud, is the fact that everything at Hayes is British. All the machines and equipment are British and the capital is British, which is a pleasing thought nowadays, when so many factories in this country are being put up to enrich foreigners.



EFFICIENCY: This British elevator raises the barrels from the store and delivers them to the wharf ready for transport by road in a fleet of lorries painted in the very familiar Wakefield green.

The "Lab." is, of course, the sanctum sanctorum of the chief chemist, and in it are many closely guarded secrets about Castrol—and, I imagine, other oils! Here, every batch of oil has to be tested for composition, purity, viscosity, specific gravity, carbon content, etc., to see it is up to standard, and to ensure that if you get some XXL in Pimlico it will be exactly the same as that you can get in Jericho. I say *can* get, because I am sure you can, although I have never been there; but the Wakefield organisation sees to it that you will not have to change your brand of oil however much you travel about the world.

IMPERIAL AIRWAYS REPORT

THE accounts of Imperial Airways for the year ended March 31 last, as disclosed in the Directors' Report, read at the General Meeting on October 15, show a trading profit, after crediting subsidies, of £155,165, compared with £169,376 for 1929-30. A larger provision is necessary for obsolescence (£94,273, against £85,387), and also for insurance (£22,616, against £17,260), with the result that a substantial reduction is shown in the net profit, which is £27,140, against £60,139. From the latter figure, however, £25,000 was last year deducted for provision for taxation, but no deduction on that account is shown to be necessary on the present occasion. As already announced, it is proposed to pay, on October 29, a dividend of 3 per cent. for the year (against 5 per cent.), absorbing £14,041, while £2,500, as last year, is written off the item "Consideration for waiver of any claims by the Air Ministry for repayment of subsidy," and the carry-forward is increased from £20,957 to £31,556.

European Services.—The report states that on the European services, as would be expected, the steady rate of progress of traffic recorded each year since the inception of the company did not continue. The regular services were well supported, but the traffic offering was not sufficient to make it necessary to schedule as many additional services as in the past—and, broadly speaking, these additional flights are naturally the most profitable. The effect of the lower traffic revenue has been counteracted to a large extent by substantial operating economies.

England to India Service.—The total traffic carried on this service shows a satisfactory increase. Air mail despatched from all countries by this weekly service averaged during the year approximately 40,500 letters, compared with 34,200 letters per flight the previous year. During the year the western stages of this service followed the route through Central Europe, and the inconvenient connections involved for passengers, particularly during the winter months, together with the disturbed state of commerce in India, adversely affected the passenger traffic. The Italian Government has, however, now given provisional permission for the service to call again at certain Italian ports, and the route through Italy recommenced in May, 1931.

England to Central Africa.—To comply with local requirements it was expedient to operate the African section of the England to Central Africa route through Imperial Airways (Africa), Limited, a wholly-owned subsidiary. The company's service to Central Africa began on March 6, 1931, and therefore less than a month's active operations are included in the year under review. The extension of this service through to Capetown is expected to begin at the end of 1931.

Generally.—Air fares and freights have been reduced in sympathy with the fall in values throughout the world, but the new aircraft operate at a lower cost per ton-mile than has ever yet been attained by the company. During the year the final call of 5s. a share was made on the ordinary shares, and the capital was increased by the allotment of 25,000 ordinary shares of £1 each to Cobham-Blackburn Air Lines as part consideration for the acquisition of that company's interests in the African route.

London-Paris Air Fares

ALTHOUGH, owing to the depreciation in sterling, increases in fares continue to be necessary on foreign sections of rail-and-boat journeys between London and the Continent, the winter air fares by Imperial Airways, on the Continental air routes, not only show no increase but are actually being reduced. By the "Silver Wing" air service to Paris it will not only be quicker, but also cheaper, to fly to the French capital from London than to travel by the fastest corresponding de-luxe surface transport. The single London-Paris air-fare is being reduced from £5 5s. to £4 12s. 6d. as against the present increased rail and boat fare of £5 8s. 2d. The reduced return London-Paris air fare is £8 15s.

The journey by air, including the two motor-car connections between aerodromes and cities, is now accomplished in 3 hr. 45 min., as compared with 6 hr. 40 min. by the fastest corresponding land-and-sea route. There are to be two winter air services in each direction between London and Paris, one leaving the London and Paris air ports at 8.30 a.m. and the other at 12.30 p.m. Return air tickets, available for 15 days, will be issued by the early morning service between London and Paris at a fare of £6 6s., and by the mid-day de-luxe service at 10s. extra.

Private Flying & Club News

CINQUE PORTS FLYING CLUB.—The weather during the week ending October 4 was mainly fair, and consequently 20 hr. 30 min. flying were put in by club members. On Sunday Mr. H. R. Law left Lympne for Le Touquet with a passenger, and returned on Friday. On Monday we had a visit from Mr. Clark, our late pilot-instructor. He arrived in the morning from Le Touquet, left for Croydon at about 11.45, and returned at 2 p.m. on his way to Geneva. On Wednesday, Mr. Charles Scott, who, it will be remembered, put up a record for a flight from England to Australia and back, arrived at Lympne. He left on Thursday and returned again on Friday. On Saturday, Mr. Owen completed his flying tests for "A" licence, and is to be congratulated on his effort; and Mr. W. Brown, of Bexhill, successfully carried out his first solo flight. During the week three new members joined the club. They are all from the Queen's Bays, who recently arrived from Tidworth in relief of the 4th/7th Dragoon Guards at Shorncliffe.

THE WILTSHIRE LIGHT AEROPLANE CLUB.—The club-house of the Wiltshire Light Aeroplane and County Club was opened informally on Saturday, October 10.

Mr. Doran-Webb, the leading spirit of this new club, has established it at High Post Aerodrome, which is just off the main Amesbury road, some two miles north of Old Sarum aerodrome. On Saturday there were some 15 visiting aircraft, and quite a fair crowd of members and their guests.

The actual flying programme was limited to a formation flight by three "Redwing" aircraft (Genets), flown by Flt. Lt. Russell and Messrs. Hordern and Payne, followed by an exhibition of inverted flying by Flt. Lt. Clarkson on the Selfridge "Moth." The pressure pump was not, however, functioning too well on this occasion, and, although his show was acclaimed by those who were seeing him for the first time, yet he was by no means up to the standard we are accustomed to from this accomplished pilot. Thereafter was a certain amount of joy-riding by the club's two "Redwings."

This enterprise should prove a successful one, for Salisbury is already an aviation-minded city, and a large one at that. The aerodrome itself would appear adequate in size, and though there are power cables—that modern curse of the flying man—on one side of it which will have to be watched, yet for all club purposes it would seem admirable. Quite a comfortable club-house has been built, and fuel pumps have already been installed, so visitors who are in the neighbourhood will always be welcome.

HANWORTH ANIMATED.—Sunday afternoon, October 11, was a very animated scene at Hanworth Park, in spite of the mist and fog.

Barnard's Circus (several small children were heard bewailing the fact that there were no monkeys, and were not appeased when their harassed parents pointed out the one and only "Spider") had some difficulty owing to the weather in getting to Hanworth from Sywell, and did not arrive until fairly late in the afternoon. By that time, however, N.F.S. had stepped into the breach and done some good joy-riding work. The crowd was immense, which just shows what suitable newspaper advertising can do. The local press, for every village in a radius of several miles, had its own paragraph about the visit, with the result that the few police on the neighbouring roads were nearly overwhelmed, much in the same way as they were when the *Graf Zeppelin* came to Hanworth.

During the afternoon there were several "turns" calculated to rouse the enthusiasm of the crowd, and such things as wing walking and what nearly amounted to aerobatics on the "Autogiro" were "done." It is difficult to see the justification for letting a man stand on the front of the fuselage with his hands above his head. No doubt it is a thrill to the crowd, who hope to see him fall off, and it probably helps to gain cash for the organisers of the show; but by doing such stunts they are taking risks which are quite unjustifiable when it is realised that, should an accident occur, then the reaction would seriously damage not only their own show, but also the whole of aviation, and that alone makes theirs a thoroughly selfish way of doing things.

Neither can aerobatics on the Autogiro do any good whatsoever to the future of that aircraft. It is pre-eminently a machine built to advertise the safety of flying, and, as such, the people who fly it will have no interest in stunting. It is not an aircraft upon which a really good aerobatic display can be done, and we are surprised that the makers countenance such a performance.

As a contrast to these sort of shows, Mr. Stace took up an Avian. Now, he had a machine upon which it was legitimate to do aerobatics, and, moreover, a machine upon which they could be done. His was an excellent show, in spite of the low cloud and misty conditions. His manœuvres were beautifully clean, and he did not forget to give the crowd the thrill they love most, namely, a common or garden spin. It is amazing how many pilots do such a show without this manœuvre. It never fails to draw the crowd, and is undoubtedly one they all appreciate.

Barnard's show finished with a parachute drop, by Mr. John Tranum, in the thick and rapidly gathering evening mist. On

THE HIGH POST OPENING: High Post Aerodrome is the home of the Wiltshire Light Aeroplane and County Club and also the south of England sales depot for Redwing aircraft. The group shows (left to right) Mr. L. F. Payne, in charge at High Post; Mr. R. R. Darling, Superintendent of the Redwing Co.; E. Hordern, the Club Instructor; Mr. Doran Webb, Organiser of the Club and Mr. Hooper, an enthusiastic member.

BRISBANE TO ADELAIDE IN ONE DAY: Mr. F. H. Broadbent leaving Essenden (Melbourne) aerodrome after refuelling during his one-day solo flight through four States from Brisbane to Adelaide on August 12. This flight was made in a Sports "Avian," using Shell spirit.

October 20 Mr. Tranum leaves for South Africa, where he will no doubt be glad to have far better conditions in which to carry out his jumps.

There were many visiting aircraft at Hanworth for the afternoon, and one of the most interesting we saw was a Klemm fitted with the new Hirth motor. This has already been described in FLIGHT, so there is no need to go into details about it on this occasion. Its reputation for smoothness has preceded it from Germany, and we were therefore glad to have this opportunity of seeing it. It certainly runs like a sewing machine and appears to keep extremely clean, while at the same time being much quieter than most such engines. No doubt we shall be hearing more about it at meetings before long. If Mr. Carberry, who is taking a similar combination of aircraft and engine to Kenya at this moment, arrives safely, and finds that it does all which is claimed for it, we shall not be surprised.

A Cricket Club.—It has been decided to form "The Gnats" Cricket Club, open to members of National Flying Services Clubs and to serving officers of the Royal Air Force. The annual subscription for original members (*i.e.*, those joining before February 1, 1932) will be 10s. 6d. The club will receive the support of the Royal Air Force Cricket Association. Ten to 12 matches will be played (including week-day, Saturday and Sunday matches). Fixtures have been offered by the Adastrians, The Royal Army Service Corps and Feltham C.C., and the remainder will be arranged against Service units of various strengths, and, if possible, one or more against teams in N.F.S. provincial club districts.

Members interested are asked: (i) To fill in and return the enclosed post card; (ii) to attend a meeting which will be held at the Hanworth Club on Saturday, October 17, at 5 p.m., to select colours, adopt rules, etc.

The return of misty weather has had its inevitable effect upon flying time, but a good average was maintained last week. Last month's total of 568 hr. has, perhaps, made one unduly optimistic, but anything less than 15 hr. a day now looks small.

The world's record holders, namely, Flt. Lt. Stainforth, Mr. J. S. Wright (motor cycle) and Mr. J. W. Street, the driver of the world's fastest train, were entertained to lunch at the Club on Wednesday, October 7. Sir Malcolm Campbell and Mr. Kaye Don were prevented at the last moment from getting to Hanworth. Mr. Street and his wife were taken on an extended joy-ride to Swindon in the afternoon. Piloted by Flt. Lt. Findlay, they escorted the "Cheltenham Flier" from Swindon to Reading in a Desoutter, and landed at Woodley, where they were welcomed by the Mayor of Reading. After tea at the Berks, Bucks and Oxon Club they returned to Hanworth.

THE PHILLIPS & POWIS SCHOOL OF FLYING continues to be very busy. The number of hours flown to date shows a very perceptible increase over time recorded for a similar period during 1930. This, taking into consideration both the financial and climatic depression, is eloquent of the amount of enthusiasm with which the School continues to imbue its members.

The monthly landing competition for the silver ash tray presented by Mr. E. D. A. Bigg is proving very popular. Mr. A. Allan, of High Wycombe, one of the School's oldest members, has now won the ash tray two months in succession.

An interesting addition to the aerodrome equipment has been made this week by installing a public address apparatus; the set chosen is manufactured by Philips Lamps, Ltd.

The aerodrome is now permanently wired with loud-speaker points to enclosures for pageants, which will obviate the too often hurried arrangements and consequent likely breakdowns of hired equipment. The clubhouse is also wired, and music for dancing, which is always rather inadequate when supplied by gramophone, can be turned on at a moment's notice, either from records or the B.B.C. programme.

THE NATIONAL TECHNICAL COMPETITION FOR TOURIST PLANES.—Owing to pressure on our space, we are unable to publish this week the final results of this competition, the preliminary report of which appeared in our last issue. Next week, therefore, we hope to give particulars of the concluding competitions—that for "quality of construction" and the tour round France.

THE NOTTINGHAM FLYING CLUB.—The flying-off of the Efficiency Test for the anonymously-given Nemo Cup took place on Sunday, October 4, sixteen solo pilots taking part. The actual tests were a series of take-offs, landings and figures of eight. Two pilots, viz., Mr. H. Ashworth and Mr. T. Bradford, tied with a total of 196 out of a maximum of 210 points. The final was re-flown on October 11, resulting in Mr. T. Bradford taking the trophy with a net score of 177, against Mr. Ashworth's 175. The Nottingham Flying Club offer their sincere thanks to the donor of the Cup.

Gliding

AN ENTERPRISING CLUB.—The London Gliding Club has shown great enterprise throughout its career, and we have come to look upon it as one of the leading clubs in the country. Its latest method of advertising the joys of gliding is to issue an extremely well got up brochure, giving a concise history of the Club, many articles all of which are of potent interest to those who glide or wish to glide, and last, but not least, a wealth of illustrations showing many types of gliders, as well as a map leading one pictorially from the Marble Arch to Dunstable Downs, where the Club gliding grounds are situated. Such a publication should be of value to all those wishing to learn more about their chosen sport, and we advise them to write to the Secretary of the London Gliding Club, 35, Milk Street, E.C.2, mentioning FLIGHT, when they will be sent a copy.

The prizes which were competed for at the International Gliding Meeting held at Balsdean on October 3. The Wakefield Trophy (left), the Manio Cup (top centre), the de Havilland Cup (bottom), the M. H. Volk Cup (right).

(FLIGHT *Photo.*)

Air Transport

Real Commercial Aviation

A FIRM which has realised that there is a future in commercial aviation, and to whom the long-sighted policy appeals as pre-eminently the sensible one, is the Ford Motor Co., Ltd., of Regent Street, London, W.1.

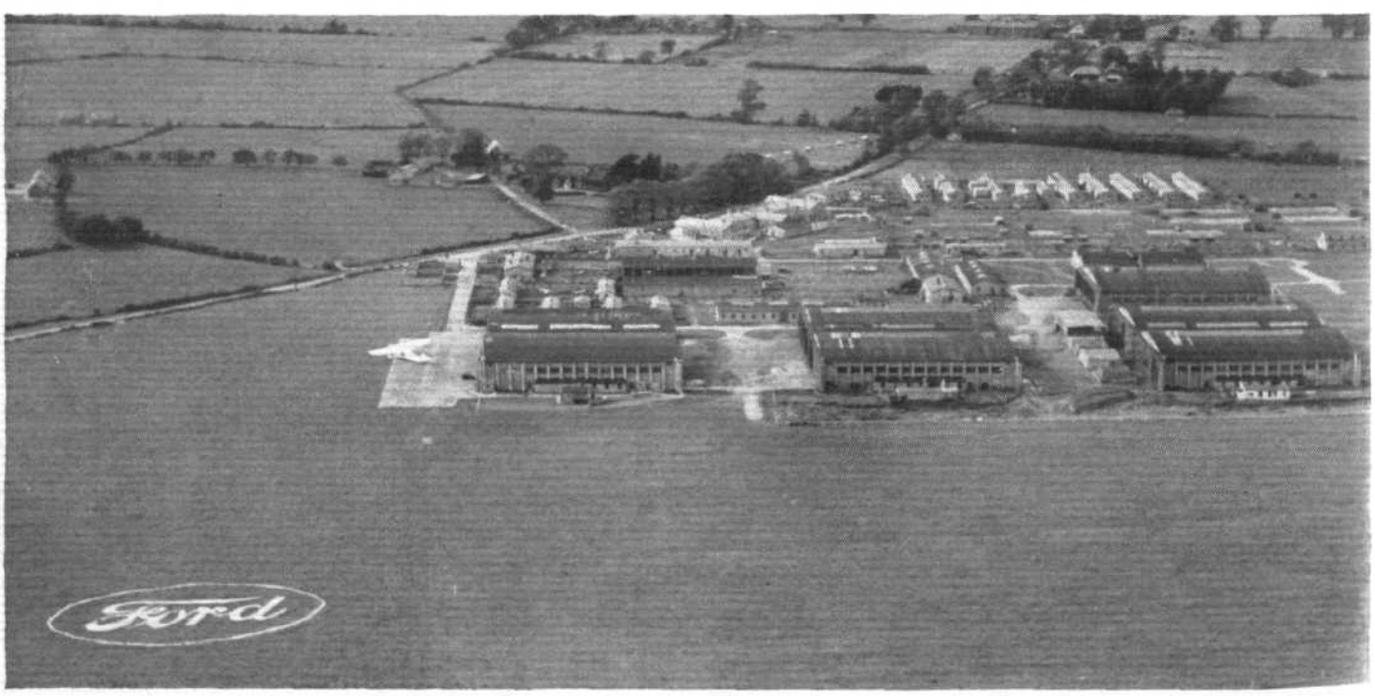
They are undoubtedly right. Aviation is bound to grow as a means of transport, and the aircraft manufacturers who will ultimately reap the harvest are those who prepare themselves to meet the demand for real commercial aircraft. I am not suggesting that there will not be very nice pickings, for many years, for those who cater for the Air Ministry's wants; of course there will, but if one is to judge by the trend of international affairs, those pickings will steadily decrease. Then will come a time—it has almost arrived already—when there will be a surplus of firms in that particular branch of the aeronautical trade, and some of them are bound to go to the wall. The long-sighted ones will have prepared themselves by previously having obtained a footing in the commercial market, but many will not have done so, and they will fade out or be absorbed by other firms.

One of the very long-sighted ones is the Ford Motor Co., which has established itself in comparative peace and quiet at Ford Aerodrome, Ford, near Yapton, Sussex. Here they are laying plans for great development. Development which will benefit the country in which they are working and not merely make money out of it, as so many firms of foreign origin have done. It is already a *sine qua non* that, whenever possible, everything at that aerodrome is to be British, and Mr. Higgs, the Aviation Manager, labours to that end. So far he has been able to obtain all he has wanted in this country, with the exception of one thing, and that is a particular form of lever jack (known as the Joyce jack in the U.S.A.) for lifting the fuselages of his machines.

The aerodrome itself is one of the war-time ones, and has, therefore, a large assortment of hangars and outbuildings adjoining it. The landing area has been put in order, and now, although not yet as good as could be wished, is yet quite suitable for all ordinary purposes. It will be improved during the winter, and should then be exceptionally good. Two hangars have been put into thorough order, re-roofed and painted, while the rooms on the sides of them have been fitted out as offices, lavatories, workshops and stores. They have been equipped with a range of machine tools such as likely to be required in maintaining and repairing Ford aircraft, and it is the firm's intention to increase these tools as the demand for them becomes apparent. One of the demonstrating aircraft was largely built in this country. The whole of the centre-section was built up from parts supplied by our own aircraft manufacturers, and this, together with the rest of the machine, was assembled at Ford. The fuselage, for example, was completely covered there and the engines were installed. All the hands employed are British, and before long there will be no part of the Ford aircraft as turned out at Ford which is not a British product, built by British mechanics and financed by British capital.

The thoroughness with which the whole place at Ford has been brought into a fit home for Ford aircraft is immediately apparent when one sees the tastefully decorated waiting rooms for visitors, the attractively laid-out flower beds and the Ford colour scheme of blue and silver permeating everything about the place. It is not overdone, nor is it elaborate, but it has just that solid well-to-do look about it which attracts customers, because they at once get the feeling that "here is a solid firm with whom we are safe and from whom we shall receive a fair deal." In fact, everything is of the best without being extravagant.

Not the least important part of the enterprise is the room that is available for expansion. Here the Ford Co. is lucky, because there are some six more hangars and many, many other buildings all ready to be taken over when required. On the west side of the occupied hangars there is already one building which has been put in order, and is now utilised as an engine overhaul shop and general



THEIR SUSSEX HOME: An aerial photograph of Ford Aerodrome, situated, most appropriately, at Ford near Yapton, Sussex, England. The hangars at present in use are the two on the left of the picture where another aeroplane is on the tarmac. The other hangars available for expansion are those to the northward. Several of the small buildings are already in use and others will be taken in as necessary. (FLIGHT *Photo.*)

store. The engine overhaul question is yet another one which shows the thoroughness about which I have already spoken. Ford aircraft have at present to use either Pratt & Whitney "Wasp" or Wright "Whirlwind" engines. It was only possible to find one mechanic over here who had had experience on these engines, and it looked for a time as though it would be necessary to import American ones; wishing to remain true to their all-British policy, the directors sent English mechanics to the States, and had them put through a course not only at the Pratt & Whitney and Wright factories, but also at the Ford factory at Dearborn.

The whole equipment shows a decided American influence, but seems all the better for this. For instance, one of the first things which caught my eye, as being eminently practical, was a tail trestle: this was mounted on castors, and thus enabled the tail to be shoved about in any desired direction, despite the fact that it was raised on the trestle. Another was the solid iron workbenches, also other benches fitted on castors, so shaped that they might be pushed right up to the aircraft in a position which would allow the mechanics to work around the engines in perfect comfort. A circular, cauldron type, of electric furnace was interesting; this was built specially for this job by the Birmingham Electric Furnace Co., and has a range of from 0 to 1,000 deg. C.

HENRY FORD, HIS MARK: The "Wasp" powered 5AT demonstrator with its appropriate registration letters flying over its home aerodrome. (FLIGHT *Photo.*)

So much for the Ford aerodrome; and I trust that from the foregoing, readers will have formed the conclusion that Ford aerodrome is being run as a sound commercial proposition and as an attractive home for Ford aircraft.

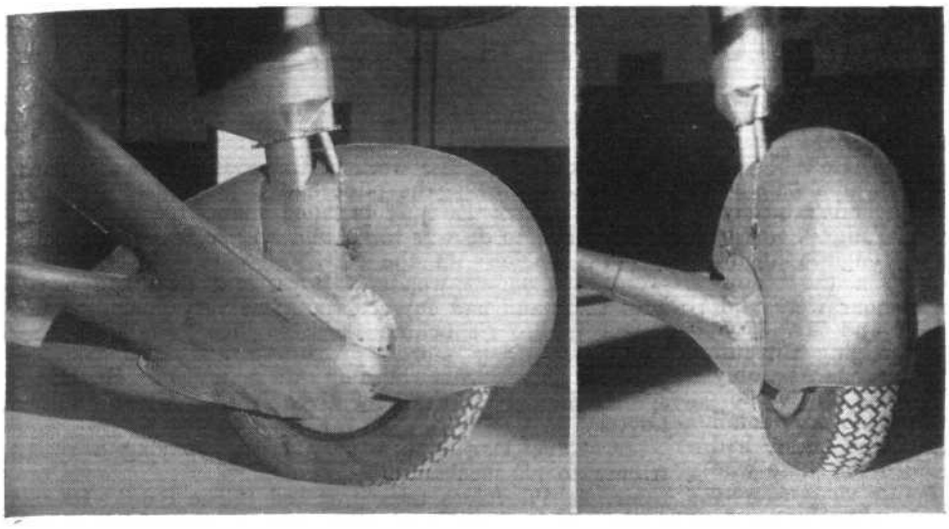
Now, with regard to the aircraft themselves. These have already been described very fully in FLIGHT, and there is therefore no need, in this article, to do other than discuss the points which are of most interest to the general observer.

Three types were at Ford. The 4-AT, a 13-passenger machine, that is, 11 plus the first and second pilots. The engines of this model are three 300-h.p. Wright "Whirlwinds." All the Ford models are high-wing monoplanes, with the pilot's cockpit in front of the leading edge, and, in keeping with Ford tradition, the passenger accommodation is exceptionally well carried out. The larger machine, the 5-AT, has three Pratt & Whitney "Wasp" engines of 420 h.p., with a consequently increased performance and load, as three more passengers are provided for. I was privileged to try this latter machine, and imagine that pilots of air lines would be very grateful to their executives if they provided them with Ford aircraft. The take-off is very good, and she is pleasant to fly. It seems a pity that the makers have not taken more trouble to balance the controls all to the same weight, for at present the elevator and ailerons, the latter in particular, are considerably heavier than the rudder. I am told, however, that this point is being remedied in later models. The view and general layout of the pilot's cockpit is excellent, and, as the aircraft trims up nicely, it should not be tiring to fly over long distances. The visibility is all that could be desired, while the windows, both in front and at the side, open in case of necessity in bad weather.

The last model I saw was the 5-AT Pullman. This is basically the same aircraft, but has had the wing raised a little, so that the head room in the cabin has been increased. The two most striking points about this particular aircraft are the luggage accommodation and the cabin decoration. The former is ingenious and unique, for full use has been made of the deep wing roots, which are a feature of this type of monoplane. In the first place, two panels in the centre of the cabin roof may be opened, and above them are found racks capable of holding 175 lb. of baggage on either side; these may be utilised for that luggage usually marked "wanted on voyage."! Outside the machine considerably more accommodation is available. The starting handle—the same which is used for running up the Eclipse inertia starters—is put over a spigot projecting below the wing, and on winding it a large kind of crate is let down, hinging on its inner end. This crate is some 18 in. deep, and comes to rest at a convenient height for loading. There are similar ones on both sides, and each holds 800 lb. The total luggage capacity is therefore 1,950 lb., which, together with 16 persons, a cruising speed of 123 m.p.h., and a range of 5.9 hr. is a pretty good performance for only ⅝ throttle!

Now, as to the decoration of the passenger cabin. This is undoubtedly the sanest, and yet most attractive, I have yet seen in any aircraft, whatever its nationality. On first entering the cabin, one is given the impression that the walls are panelled with a veneer of decorative wood. Even on close inspection this is difficult to perceive as a fallacy. It is so, however, for that veneer is nothing more nor less than one photographed on to aluminium sheeting. This is a Ford process, and one which should prove applicable for all sorts of purposes. I can visualise it being used for very attractive instrument boards in privately-owned aircraft, for example. The rest of the cabin is in keeping with this decoration. The seats are of ample size and extremely comfortable, although I should have thought that in an aircraft of this class adjustable ones might have been provided with advantage to the selling qualities. The three rear seats have been run together in a fore and aft line to form a couch, upon which even the largest man is able to recline at ease. The rear end of the cabin has all the usual lavatory accommodation, together with a cupboard which may be used for stores, or, as has been done in some cases, fitted out as a cocktail bar. I have inspected the interiors of all the ordinary commercial aircraft which have been seen over here, and I must say that this Ford Pullman has them beaten for sheer comfort. After all, it is comfort combined with speed which is going to sell air transport; speed used to be considered of chief importance, but I am inclined to the opinion that comfort is now of greater importance, for those who can afford to travel as they

SOLID BEAUTY: The 5AT is a very graceful machine and although quite fast—its top speed is 150 m.p.h.—does not, in consequence, lose its air of solid comfort. The centre engine will in future also have a Townend ring type of cowling around it. (FLIGHT *Photo.*)



DETAILS THAT COUNT: Great attention has been paid to the streamlining of such details as the undercarriage on the 5AT Pullman. The way in which the radius rod and axle are faired into the "spat" is shown very clearly in these pictures.

(FLIGHT *Photo.*)

wish do not see the point of being extremely uncomfortable while doing it.

We shall hear more of the Ford organisation in this country, and no doubt before long the British Ford aeroplane will be as well known over here as is the Ford car, which, by the way, I hear is coming out from the new factory at Dagenham at the rate of 50 per day! These latter products are well worth the study of those who consider that, provided the first cost is very low, the horse-power tax can be disregarded when the question of performance and service obtained from a motor-car is under consideration.

Every works requires works-hacks (not meant in a derogatory sense), or motor-cars which they know will always get their staff there and back. Such a car is the new Ford—though it is equally good for the man who wishes to have one which he never need touch. Its performance is quite exceptional. The gear box is robust and easy to use; gear changing, therefore, becomes a matter of pushing the gear lever about with very little worry about the engine revolutions at the time. The acceleration is just that type which makes traffic driving such a pleasure, and which enables one to cope with large motor-coaches—even on hills! Naturally, for such a performance one has to pay the bill, for a fairly large consumption, though 20 m.p.g. is claimed for the standard or 24-h.p. model. The one I tried did not manage to control its thirst to anything like that extent, however, but perhaps it was exceptional and felt that it ought to justify its "prohibitive" origin. Still, such matters do not alter the fact that at the price the Ford can claim to be as good value as it is possible to get.

CIVIL AVIATION IN ITALY

IN the Report on the Economic Conditions in Italy recently issued by the Department of Overseas Trade, the following information is given regarding the progress of civil aviation in that country during 1930.

During the year 1930 three extensions were made to the existing commercial lines, viz.:—(1) The extension from Venice to Trento on the line Rome-Venice; (2) the linking up of the Trieste-Turin line to Genoa; (3) the extension of the Brindisi-Athens line to the Island of Rhodes, with a weekly service.

The services from Rome to Milan, Rome-Venice-Trieste and Rome-Turin, were increased to a daily service.

On April 1, 1931, the new extension to Berlin of the Rome-Munich commercial air line was inaugurated. German aircraft make a direct flight to Rome and Italian aircraft a direct flight to Berlin.

A Royal Decree published at the end of December, 1930, cancelled all previous Agreements between the Air Ministry and the Società Anonima Navigazione Aerea, and at the same time provided for a new Agreement under which the company will operate the following civil air lines:—1. Rome-Genoa-Marseilles (815 km.), twice weekly. 2. Rome-Genoa-Marseilles-Barcelona (1,190 km.), twice weekly. 3. Rome-Genoa (430 km.), daily. 4. Rome-Naples-Palermo (540 km.), daily. 5. Rome-Naples-Syracuse (675 km.), daily. 6. Syracuse-Tripoli (550 km.), thrice weekly.

The machines to be used are twin- and four-engined Superwal seaplanes, and the Government agrees to pay a subsidy of 15 or 28 lire, respectively, per kilometre flown. The agreement is for a period of ten years, and the number of kilometres flown must be so arranged that the subsidy does not exceed 24,200,000 lire per annum.

The Royal Aero Club has carried out a considerable amount of propaganda during the year and Centres have been opened in 17 of the principal towns, with 40 branches in Italy and two in the Colonies. Tourist type aircraft are supplied to these Centres at Government expense, and members of the Royal Aero Club are taught to fly for very low fees.

In September, 1930, the Compagnia Nazionale Aeronautica was authorised to organise a Civil Flying Training School at the "Littorio" aerodrome in Rome, to be known as "Aerocentro da Turismo del Littorio," while the school will be run more or less in conjunction with the Military Flying Training School, situated at the same aerodrome.

Statistics relating to Italian Civil Aviation in the years 1929 and 1930 are given below:—

	1929.	1930.
Kilometres flown ...	... 3,008,965	4,438,912
Hours flown ...	... 19,433	28,138
Passengers carried	... 25,034	38,361
Mail carried ...	... kg. 25,029	41,674
Newspapers carried	... ,, 39,224	26,109
Baggage carried ...	... ,, 322,100	474,759
Freight carried ...	... ,, 134,815	137,610

The above figures, which are actual and not by stages, point to a steady increase in load-carrying and passengers, with only two serious accidents, both at sea, involving the loss of life of seven passengers and five crew.

In 1930 there were seven companies operating 24 lines, the total length of the lines being 14,889 kilometres, an increase of 1,517 kilometres compared with the preceding year.

The estimates of the Ministry of Aviation for 1931-32 provide 73.8 million lire for civil aviation, being 3.5 million lire less than the previous year, of which 71 million lire are required for subsidies. The smaller amount, compared with 1930-31, required for subsidies is due to an assumed decrease in the subsidised companies' bills for material and labour.

Catapult Mail Plane Lost

ONE of the mail planes which was catapulted from the German liner *Bremen*, en route for New York, 650 miles off Cape Race on October 5, was lost off Cobequid Bay, N.S. The wrecked machine was found near the shore, with the mail bags floating nearby. The body of one of the pilots was found later.

A New East African Service

DAR-ES-SALAAM, Zanzibar, and Tanga are to be linked to the main East African air line by a weekly feeder service operated by the Tanganyika Government and Wilson airways machines. At least a week will be saved, bringing Dar-es-Salaam nine days from London by air, in conjunction with Imperial Airways services.

ROLLS-ROYCE EXPERIMENTAL DEPARTMENT

Triumphal Banquet at Derby

THE Experimental Department of Rolls-Royce, Ltd., entertained some 250 guests at a banquet in the Assembly Rooms at Derby on Saturday, October 10. The purport of the banquet was to celebrate the successes of Rolls-Royce engines in the Schneider Trophy, the record flight, and in the motor-boat *Miss England II*. The guests of honour were Sqd. Ldr. Orlebar and the High-Speed Flight and Mr. Kaye Don. Mr. A. F. Sidgreaves, O.B.E., Managing Director of the company, was in the chair. The spacious Assembly Rooms would not hold all the company, and an overflow dinner was held at the Midland Hotel. Every detail which could contribute to the comfort of the guests had been thought out. Transport was provided for those who had to travel up from London, and the visitors were guests of the firm for the night at the Midland Hotel.

The day was auspicious in more than one way. In the course of it a Miss Orlebar made her first appearance in this high-speed world, and her father, after making an excellent speech in reply to the toast of "The Guests," departed to attend to domestic matters. We beg to offer him our hearty congratulations.

The material part of the dinner, both solid and liquid, was excellent, and after it had been discussed and the Loyal Toast duly honoured, the chairman rose to propose the toast of "Our Guests," coupled with the names of Sqd. Ldr. Orlebar and Mr. Kaye Don. Mr. Sidgreaves started by referring to the pleasure which everyone had felt on hearing that the King had conferred the honour of the Air Force Cross on Flt. Lts. Boothman and Stainforth. He spoke of Mr. Kaye Don and Lord Wakefield, and expressed his thanks to all the men who had worked on *Miss England II*. In particular he praised the restraint of Mr. Kaye Don in refusing to discuss the matter of crossing the line at Detroit. Turning to the Schneider Contest, he said that in 1929 he had hoped that a long time would be given to them to prepare for the next contest. In December, 1930, he thought that things had been left too late. In January last he attended a meeting at the Air Ministry at which two Cabinet Ministers were present, and he began to realise that the defence of the Trophy would rest upon Rolls-Royce. He disliked to mention names, as the result had been due to team work, but he would mention that of Mr. Rowledge. He also mentioned Mr. Mitchell, who had designed the winning machines of 1922, 1927, 1929 and 1931. He also offered thanks to the help received from the experts of the Air Ministry, and in particular from Group Capt. Gill, Maj. Bulman, and Maj. Buchanan. Then there was the High-Speed Flight and its C.O. Sqd. Ldr. Orlebar. Finally, he paid a tribute to the A.I.D., and said that "red tape" had never been allowed to stand in the way of the work.

Sqd. Ldr. Orlebar, in reply, said that when he came to the dinner, he felt that he had nothing to say, but that now not even Rolls-Royce's most experimental people could discover what he had to say. He offered his thanks to the firm. It had done a tremendous work, and had done it quickly. The work of the constructors was hard, unobtrusive work; the pilot had a jolly good time and got the credit. He just pedalled round the course. All that he had to do was to sit still and steer; the machine and the engine did the rest. These engines had been given to them as wonderful toys, and they had played with them and had enjoyed the game very much. It was a real joy to sit behind those engines. Moreover, they knew that every mortal precaution had been taken to prevent them from burning their fingers. He offered special thanks for the help given by Mr. Green and Mr. Lovesey.

Mr. Kaye Don replied very briefly, paying a special tribute to his mechanics.

Mr. E. W. Hives then proposed "The S.6." He said that they had estimated the horse-power at 1,500 when Mr. Mitchell chose the Rolls-Royce engine for his machine. When fully developed, the engine had run with monotonous reliability. Our competitors had realised that they had no sporting chance against the S.6. He said that the Air Ministry had not had sufficient recognition. They had done their job well. As a rule, they only received recognition when things went wrong.

Mr. Coverley supported the toast, and said that they had all enjoyed the task of getting the engines ready.

Mr. R. J. Mitchell, in reply, said that at the beginning he had said to Mr. Rowledge: "Of course, you will get your horse-power as high as possible." Later on he began to rue that remark. Finally, as the horse-power continued to go up, he began to hate Mr. Rowledge. Next time he would say "Go steady with your horse-power."

Mr. Rowledge, also replying, said that an architect had remarked to him that the S.6 vied with the birds in beauty. Mr. Mitchell had been a very easy man to work with. Modestly he said that the designer's part had been small; the chief credit was due to the production people. He ended by paying a tribute to Lady Houston and Lord Wakefield.

After the dinner was over, an excellent little kinematograph display was given in another room, showing *Miss England II* racing and overturning at Detroit, and the Schneider Contest and record flight.

On the following morning a small party, including Flt. Lts. Long, Boothman, Stainforth and Dry, were conducted round the works. The engines used in the Schneider and in both the record flights had been dismantled, and the parts were laid out on tables for inspection. The condition of all parts was amazingly good after the terrific ordeal to which they had been subjected. Even the engine which had been under water was in surprisingly good condition. The result is all the more surprising when one thinks of the short time given for the work, and remembers that so late as the August Bank holiday the firm was having trouble with the crankshaft. One wonders if any engine firm has ever faced worse difficulties and surmounted them so triumphantly.

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Royal Air Force Short-Service Commissions

THE Air Ministry announces that, as from October 1, 1931, certain of the conditions of entry for candidates for short-service commissions in the Royal Air Force have been revised. In future, candidates must be unmarried and have attained their 18th birthday, but not their 22nd birthday, at the date of receipt of the application in the Air Ministry. The previous Regulations provided for acceptance between the ages of 18 and 25. This reduction of the age limit will allow of all accepted candidates being eligible to compete for permanent commissions, of which a limited number are offered annually to short-service officers who are recommended and qualify for specialist training by competitive examination among themselves.

Brooklands School of Flying

AN interesting little brochure has just been drawn up by Mr. E. A. Jones, chief instructor at the Brooklands School of Flying, entitled "Training for Advanced Airmanship." It contains a letter written by Sir Horace Plunket, who for seven years was working head of the Department for Technical Instruction in the schools in Ireland. Sir Horace, at the age of 75, signed on as a pupil at Brooklands and carried on his course up to "A" licence standards, though he could not get a medical certificate. In the course of his letter he writes: "The time has now come when aviation ought to be included in the general system of education in this country on its practical (or vocational), as distinct from its literary, side." The school intends, while continuing its existing services to pupils of all kinds, to pay special attention to training for a "B" licence, that is to say, to preparing pupils to take up flying as a career. It emphasises that "those entering the fraternity must be prepared, in order eventually to hold positions of trust and responsibility, to work hard, be amenable to discipline, be self-reliant and resourceful, and, above all, lead a healthy and sober life. No others will succeed." The cost of gaining a "B" certificate is estimated at about £300.

AERONAUTICAL RESEARCH

Report for 1930-31 Published

(*Concluded from page* 1012)

Fluid Motion

IN last year's report the Committee called attention to the importance of gaining new knowledge in connection with the flow of air over a surface. Here the wind tunnel provides the ready instrument for experiment, but it has one characteristic which may make results difficult of interpretation. This is the presence of eddying or turbulence in the air flow, due to the walls of the containing building and the method of leading the air into the tunnel.

In a theoretical paper (T.3009*) Professor Taylor has examined the various factors which bear on this question, and has laid down the lines upon which a wind tunnel might be designed which should be comparatively free from turbulence. Mr. Simmons and Mr. Salter have made experiments (see T.3046*, *a* and *b*) with a model wind tunnel (see Illustration No. 2) having an exceptionally wide entry and a large contraction of the airstream before it reaches the experimental portion. It appears that with a very large reduction from the outer diameter of the intake a much steadier wind tunnel can be designed. In this experimental model, measuring 1 ft. diameter, the deviations from the mean velocity are about 50 times better than in the previous best N.P.L. tunnel.

If turbulence can be reduced to a minimum it becomes easier to interpret the results of experiments, but the Committee realise that the atmosphere itself, in which aircraft fly, is not altogether free from turbulence. Elsewhere in this report attention is drawn to investigations that are to be put in hand to measure the turbulence that is normally, and exceptionally, present.

As regards actual experiments on the surface layer of air near models, one of the most interesting researches completed during the year has been that by Mr. Fage and Mr. Falkner on a large symmetrical aerofoil (see R. & M. 1315). With the aid of delicate instruments measurements of the pressures very near the surface have been made successfully. Some new phenomena have been found which have not yet been adequately explained. From the exploration of the air flow, from measurements of drag of the model, and from measurements of the velocity in the boundary layer the values of the frictional drag of the wing have been severally estimated and found to be in close agreement.

Several studies of air flow have been made by visual methods. Mr. Simmons has greatly improved his application of titanium tetrachloride for the generation of smoke in an air stream, and has correlated to some extent the records thus obtained with the fluctuations of current in very fine electrically heated wires placed in the flow. At the Imperial College, Mr. Tanner, working under Professor Bairstow, has shown by means of smoke (see R. & M. 1352) that under certain conditions there is a reversal of the direction of flow in some regions near the surface of an aerofoil. At the N.P.L., Mr. Townend has developed a new method of showing up the flow, depending upon the fact that, when suitably illuminated, the wake behind a heated wire is visible for some distance downstream even at high wind speeds (R. & M. 1349).

Materials

The general study of fatigue at the National Physical Laboratory is now being directed to include the field where corrosion becomes an important factor. The investigations on light alloys at the R.A.E. and the N.P.L. now embrace a greater proportion of work on magnesium, whose strength properties and light weight will have immediate application to aircraft construction when the corrosion difficulty, upon which research is in progress, has been reduced. Beryllium as a constituent in various alloys is also being studied.

Application by the Industry of certain researches on materials will be possible as the result of work completed during the year. A long series of experiments (see E.F. 268* and T.3029*) on thin metal strip and square panels of different materials has been completed at the N.P.L. (see Illustration No. 3), and the loads under which buckling occurs have been determined. Mild steel tubes for use in aircraft are being tested in torsion by Professor Andrew Robertson at Bristol University. A simpler means of protecting magnesium alloys against corrosion has been found at the Royal Aircraft Establishment. Many of these researches were commenced as a result of suggestions put forward by the Aircraft Industry.

* To be published.

Meteorology

Mention was made in last year's report of a research into the structure of the wind on which the Meteorological Office has been engaged at their station at Cardington since July, 1926. Simultaneous observations of wind direction and wind velocity were obtained with five anemometers, four on the level of the aerodrome and one mounted on a high tower above the Meteorological Office. This valuable investigation has now been completed, and a report has been received but not yet discussed.

Another research on wind undertaken by the Meteorological Office has been directed towards investigating the air disturbance set up in the neighbourhood of the Rock of Gibraltar during high winds. Mr. J. H. Field has been in charge of this investigation, work on which was divided into two parts. In the first, experiments were made in the wind tunnel at the National Physical Laboratory on a model of the Rock of Gibraltar (see Illustration No. 4), the disturbances set up in the artificial wind of the tunnel being carefully examined and mapped. Mr. Field then proceeded to Gibraltar, where he made experiments with balloons and a special instrument devised by himself which was raised by a kte. The observations at Gibraltar showed that the disturbances found in the wind tunnel were a good index of the actual disturbances around the Rock. As a result of the work it has been possible to mark out the dangerous areas for flying in winds of different directions. Mr. Field has prepared a detailed report of his work, which has been discussed by the Aeronautical Research Committee and which it is hoped will be published by the Meteorological Office in the near future.

Civil Aviation

Gliding.—The gliding movement has been brought to the attention of the Committee, and in their discussion of its bearing on research they have had the cordial co-operation of Mr. G. M. B. Dobson, Mr. Gordon England (the Chairman of the British Gliding Association), the Master of Sempill, Sir Gilbert Walker and Herr Lippisch (Director of the Research Section of the Rhön-Rossitten Gesellschaft on the Wasserkuppe).

In Germany, flights in gliders have been made, in certain types of weather, for distances of over 100 miles, and from a hillock only 100 ft. high a sailplane has been taken to a height of 2,500 ft. In this country, in attempts to make ascents from level ground, experiments have been commenced using motor-cars to give the velocity required to raise the glider to a height above the ground at which it can take advantage of up and down currents and so gain further height.

Very high performance types of sailplane, with a drag/lift ratio as low as 1 in 20 or less, have been designed in Germany, and there appears to be some promise with this type of aircraft for increasing knowledge both of the aerodynamic properties of aeroplanes and of the movements and strengths of air currents. The Committee are of the opinion that any scientific advances to be gained from gliders in this country require prior successful development of the art of gliding. They are aware of the official encouragement which has been given by the Air Ministry to Light Aeroplane Clubs, and they have recommended a limited financial support of Gliding Clubs. Assistance for scientific purposes would best be given to a Club specially well suited to develop the art on scientific lines and prepared or willing to make an effort in this direction. If this were done, the Committee would keep in touch with such a Club and be prepared to help it by advice so far as they were able, so as to be in a position to take advantage of any opportunities that might present themselves for scientific development.

Air Transport

The Committee have been kept informed of the work in progress at the R.A.E. on the fog landing problem. Some advance has been made in this most difficult subject;

while the balloon method may be suitable for the frequent fogs of low depth found in this country, for the more difficult problem of directing an aircraft in a fog of considerable depth wireless methods are needed and should be tried out, advantage being taken of the knowledge gained by the extensive researches in hand in the U.S.A., where large sums of money have been devoted to this end.

The Committee welcome the extensive development that is taking place in Imperial air routes. Following the series of flights for several years by Service aircraft over the route from Cairo to the Cape, Imperial Airways have inaugurated this route for mail purposes. With extended flying here and on the India-Australia route, and with the steady reduction in the times of flights between distant points of the British Empire, it is expected that many new problems will come forward in which the Committee will be able to render assistance. One of the more important outstanding matters is the reduction of noise with a consequent increase in the comfort of passengers.

Aircraft Noise

The main sources of the noise of aircraft are the airscrew, the engine exhaust and engine clatter. Without an appreciable reduction of each, a saving from any one source will not produce an appreciable effect in the aircraft cabin. Some idea of the level of noise is of interest; the scale for its intensity is measured in decibels.

As is the case with many physiological phenomena, a logarithmic law is approximately followed by the ear in recording sound intensity. The scale of the instrument designed for measurements of the noise of aircraft has accordingly been arranged to give approximately equal loudness steps on a logarithmic scale each of 5 "decibels," where the total range of the ear, for a note of the pitch used as the standard of comparison in the instrument is about 130 "decibels." If the threshold of audition is taken as zero the conversational range of noise from quiet to loud ranges from 40-60 decibels. The noise in the compartment of a steam train will on this basis be about 60 and the onset of a sense of pain in the ear is 130. At a distance of 80 ft., the noise level of an airscrew running at quite low speed is 70, the silenced Lion engine exhaust is 80 and the unsilenced exhaust reaches the noise level of 94. At distances of only 10 ft. the corresponding noise levels for the engine exhausts are 100 and 110. When these figures are compared with the steam train compartment at 60 there is seen to be much room for improvement.

The difficulties of taking measurements relative to a moving airscrew are considerable, and the experiments are expensive. With a reduction in airscrew tip speeds to about 600 ft. per sec. from the more normal figure of 850, about 20 decibels can be saved. The silencing of exhaust noises has proved to be a difficult problem. No silencer yet tested on an aircraft has given a reduction of more than about 10 decibels. While very effective silencing can be obtained on the engine test bench, the difficulties of adapting the methods to flight conditions are very great, and have not yet been overcome. No attack has yet been attempted on the reduction of engine clatter, but in this connection it is interesting to observe that the sleeve-valve engine, whose development for aircraft is desirable from other points of view, will be free from the major portion of the engine clatter present with the poppet-valve engine.

If a considerable reduction of noise to the passengers is required it must be made at the original source, but there is scope for improving the exclusion of noise from the cabins of air liners. The best type of partition appears to be a double wall packed with light absorbent material. With an approximate weight of 1 lb./sq. ft., a reduction of 30 decibels has been obtained with specially designed filled double panels. The reduction of the noise level in an aeroplane cabin to about 75 decibels appears possible, but no measurements in actual air liners have yet given values lower than 80 decibels; *i.e.*, the noise is very much louder than in the compartment of a steam train.

Accident at Meopham, Kent

The accident to the Junkers F.13ge low-wing monoplane G-AAZK at Meopham, Kent, on July 21, 1930, was referred by the Air Ministry to the Committee, and the Accidents Investigation Sub-Committee have made a thorough investigation, which is described in R. & M. 1360.

A careful examination of the structure showed that there were no defects in the material and no incorrect assembly, and in the report a critical examination is made of various other theories which might have accounted for the accident. That the engine cowling blew back and obscured the pilot's view was disproved by evidence. The breaking of an airscrew blade in the air, resulting in the application of an unbalanced force to the aeroplane sufficient to tear the engine from its mounting, was ruled out since the engine struck the ground with airscrew intact. The wooden bearers under the engine did not fail and permit the engine to come away from the aircraft. There was no evidence of weakening of the fuselage or tail skid prior to the accident, which might have resulted from the pegging down of the aeroplane in the open at Berck during the week-end before. An explosion did not occur in the aircraft due to ignition of petrol vapour or to some other cause, since there were no signs of burning or singeing or interpenetration of parts of the structure, and no series of breakages radiated from a centre.

When these possible causes were eliminated there remained only a breakage from a too rapid pull out from a dive, or some new fact that might come forward. The tail of G-AAZK broke in the air, and yet this part was stronger than the main structure for all the ordinary conditions of flight. Had the accident been due to flattening out, the wings must have broken before the tail. After the failure of the wings, the aerodynamic forces acting on the structure were, in the opinion of the Committee, insufficient to break the tail. It appeared, therefore, to be certain that the tail must have broken first, for it did not come down intact with the main structure nor had it been struck by any other part of the craft. As corroborative evidence, an analysis of accidents in Great Britain over a large number of years has shown that in no case has a tail broken subsequently to the failure of the wings. The Committee had, therefore, to search for an explanation which would account for the prior breakage of the tailplane.

A model of the tail of the Junkers F.13 aeroplane was constructed to reproduce the elastic and aerodynamic properties. This model tailplane, together with part of the main wings and centre section, was tested in a wind tunnel to ascertain whether flutter of the tail unit would account for its breakage, but the critical flutter speed was found to be too high. During these experiments, however, a peculiar phenomenon was observed which was later found to give rise to movements of considerable violence under certain special conditions of flight. This phenomenon, described as "buffeting," is an irregular movement of the tailplane caused by the eddy system shed by the main wing when nearly stalled. This low-wing monoplane had previously been described as exhibiting a buffeting of the tail organ during landing. At these low speeds during landing the amount of oscillation of the tail is quite small, and it is not likely to result in any damage to the structure; but with a combination of high speed and high angle of incidence that can only occur temporarily in flight, and may be maintained for only a few seconds at a time, the tunnel experiments showed that large deflections will occur due to buffeting. The Sub-Committee concluded that in the very turbulent air in which the aeroplane was flying the attitude became such that violent buffeting set in at about cruising speed. The tailplane was thereby broken and the other breakages followed.

As a consequence of this accident the phenomenon described as buffeting is being investigated very carefully (see Illustration No. 5), and steps are also being taken to place the measurement of turbulence in the air, described generally by pilots as bumpiness, on a scientific basis by the carrying of accelerometers and by other means. In connection with this accident, the Committee have also stressed the importance of informing the public that by removing parts from wrecked aircraft for retention as souvenirs they may be destroying valuable evidence.

Accident to H.M. Airship R.101

The Committee cannot conclude this Report without a reference to the disaster to R.101.

The design and construction of this airship had been the subject of most careful thought. Great skill had been bestowed upon the task, and R.101, it was hoped, was to be a triumph of British ability and workmanship.

Airport News

CROYDON

ANOTHER week of summerlike weather has kept things humming, and passenger traffic is keeping at a high standard for the time of year. A load of 30 or so passengers on Imperial Airways' midday service is quite a daily occurrence, and all other companies are getting their share. On Monday, Sir Alfred Yarrow, the shipping magnate, chartered a special aircraft from Imperial Airways for a trip to Rotterdam. He is 90 years of age, and looks good enough for many more years yet. Before the departure he was commandeered by the talkie fiends and persuaded to say a few words for the public benefit. Mr. Olley was his pilot, as is usual for all special charter work. On the same day K.L.M. sent a special machine from Rotterdam to Southampton to pick up a load of gold from America. Holland must be stocked full of this precious metal judging by the tons that have gone there by air alone recently.

On Tuesday a Fokker F.7B. arrived from Zlin, in Czecho-Slovakia, with a party of seven or eight on board. This machine is the property of Mr. I. A. Bata, reputed to be the greatest boot and shoe manufacturer in the world. They came to visit the Boot and Shoe Fair in London. On Wednesday they wanted to proceed to Manchester in the Fokker, but the pilot stated that the Air Ministry authorities had refused him permission to proceed there owing to their airworthiness certificate being out of date. They returned to Zlin on Saturday, accompanied by a "Moth" piloted by Mr. Pike, of de Havilland's. Mr. Bata anticipated the purchase of this machine.

The whole week has been remarkable for the various well-known people who have travelled, included among them being Lord Amulree and Sir Malcolm Campbell. Mrs. Cleaver came over in her new "Puss Moth" on Friday, which is complete with spats. Aviation Tours, Ltd., have been doing brisk business here over the week-end with the old W.8B. G-EBBI, which, as is well known, this firm chartered some months ago from Imperial Airways, and have since been visiting various places all over the country, doing great business. Their appearance at Croydon caused much indignation amongst the resident joyriding concerns, and daggers were drawn throughout the week-end, each firm trying to outdo the other. Aviation Tours were charging 5s. per flight, like all others, but they were giving rides about double the duration the others were giving. This proved an attraction, naturally, as human nature always likes a lot for its money.

Several "A" pilots have again flown for their "B" ticket, including Roger Frogley, the famous speedway rider. The coming week sees the end of the Luft Hansa night service for the season, and Croydon will become quite a sedate place at night. This will no doubt please many of the residents, who always like to find something to complain about. The only noise they will now be able to complain of will be the cats courting on the tiles, so we shall be free from blame for a bit.

The traffic figures for the week were:—Passengers, 1,124; freight, 98 tons.

P. B.

Night Flying at Heston

THE night flying display which was to have taken place at Heston last Saturday and Sunday was, unfortunately, cancelled on account of the fog. Weather permitting, however, there will be flying next Saturday and Sunday, October 17 and 18. On the Sunday evening at about 8.30 p.m. Capt. Stewart will make a parachute descent. Both he and his parachute will be electrically illuminated, so that the event should be of a particularly spectacular nature.

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CHANGES AT THE FORUM CLUB

A SMALL dinner was held by the Aviation Group of the Forum Club on Tuesday, October 13, to greet their new Chairman, Mrs. Shelmerdine, the wife of Col. F. C. Shelmerdine, the Director of Civil Aviation. Owing to the regrettable illness of her father, Mrs. Shelmerdine was unable to be present in person, and was represented by Col. Shelmerdine himself.

MRS. CHALMERS was in the chair, and in a short humorous speech introduced Col. Shelmerdine, and expressed the regrets of everyone present at the circumstances which prevented Mrs. Shelmerdine being with them. She drew attention to the fact that the Hon. Mrs. Forbes Sempill, the previous Chairman, had had to resign owing to the loss of her voice, and then went on to describe the fortunate circumstances which led to the Group getting Mrs. Shelmerdine to replace her.

MISS ALICE WILLIAMS, the Chairman of the Executive Committee of the Forum Club, then read the speech which Mrs. Shelmerdine was to have made. In this speech Mrs. Shelmerdine hinted at plans which she was hoping to bring to fruition to further the cause of women in aviation, a matter which she said she was taking very seriously indeed.

COL. SHELMERDINE next made an extremely well chosen and interesting speech. He pointed out that the aviation circle was at present not very large; in fact, he said, one saw the same people day in and day out. It was here, he felt, that a Group such as that of the Forum Club would help matters considerably by enlarging this circle and by suggesting improvements. He said that aviation was bound to suffer under the present crisis, but there were still many ways in which people could help without incurring great expense. Two ways which immediately sprung to his mind, he said, were the encouragement of more towns establishing landing grounds and also the more wide-spread marking of towns so that their names could be read from the air. Col. Shelmerdine then went on with a brief summary of the Empire Air Routes as they are to-day, and sketched the existing position of those to Africa and India. He showed his vast knowledge and complete grasp of the subject, and finished up by hoping that next year would see a 12-day service to the Cape and a 13-day service from the Cape to India. He intimated that the Air Ministry already had their eyes on a twin-engined aircraft with a cruising speed of 140 m.p.h., which would be particularly suitable for the journey to Australia, but which there was difficulty at present in getting the Government to pay for it.

The party then adjourned, and a little later listened to a short lecture from the Hon. Mrs. Victor Bruce, who is Vice-Chairman of the Group. Mrs. Bruce regretted that she was unable to attend the dinner, as she had been lecturing at Folkestone and had only just arrived back. She described her experiences in Angora during her world flight and the methods by which she succeeded in obtaining permission to fly over Turkey where other pilots have failed; these are best summed up by saying that no mere man could have done it!

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International Air Rules

A MEETING is being held at the château of Prince Valentine Bibesco, President of the F.A.I., near Bucharest, with the object of simplifying the formalities necessary when an airman flies from one country to another. The president proposes to discuss a reduction in landing fees, with special rates for tourist aeroplanes, the creation of an aerial passport in place of the present documents, suppression of annual medical examinations of pilots of tourist machines, the reduction of the number of forbidden zones, and some other points. At the conference are—Lord Amulree, General Balbo, M. Dumesnil and Herr von Höppner.

Airisms from the Four Winds

Kingsford Smith Leaves for Home

AIR-COMMODORE KINGSFORD SMITH, having failed to break the record for a flight from Australia to England, and having been banned from flying back by a medical adviser, left England for Australia by the common-or-garden boat on October 10. He will have as companion on the journey home Mr. J. A. Mollison—whose record he tried to break. He says he hopes to have another try next year—well, better luck next time.

The Vickers " Vildebeest " on Tour

SWEDISH naval and air officers, accompanied by the British Minister in Stockholm, on October 7, saw a successful demonstration by the Vickers " Vildebeest " torpedo-carrying aeroplane which is making a tour of the Scandinavian countries. Two Swedish officers accompanied the pilot, Capt. H. C. Biard, during its manœuvres. At the Finnish Admiralty's request, the machine was next day taken on to Helsingfors.

The Lindberghs Returning Home

COL. AND MRS. LINDBERGH have cut short their air holiday in China, and are returning to the United States by steamer, on account of the death of Mr. Dwight Morrow, who was Mrs. Lindbergh's father.

Progress of the Blackburn Demonstration Tour

Two of the three Blackburn aeroplanes—the " Segrave " cabin monoplane (two Gipsy III engines), flown by Capt. A. M. Blake, and the metal " Lincock " light fighter (Armstrong Siddeley " Lynx Major " engine), flown by Capt. T. N. Stack—which left Brough aerodrome on Sunday, October 4, in company with Capt. H. J. Andrews in a Gipsy II " Bluebird " light aeroplane on a demonstration tour of Europe, are at the time of writing at Cologne, and the " Bluebird " has gone on to Prague. Brussels was reached on Monday afternoon, October 5, after flying from Lympne in eighty minutes, and a very successful demonstration was given before a number of important Belgian officials, Mr. Robert Blackburn, who accompanied Capt. Blake in the " Segrave," being handed a letter of greeting from the King of the Belgians. Representatives of the British Embassy and of the Belgian Press were also present. On account of the interest shown in the three machines, instead of proceeding the same day to Cologne, according to programme, the Circus remained in Brussels until Wednesday, October 7. On the next day the flight was resumed, the " Bluebird " being the slowest machine, going on ahead and the " Segrave " and " Lincock " following together. On reaching Cologne, the " Lincock " was found to have developed loss of pressure in one of the oleo pneumatic undercarriage struts, and, as no pump or spares could be obtained on the spot, a telephone message was put through to Brough, and a mechanic with the necessary gear left Croydon by Imperial Airways the next day. As soon as the adjustments, which are neither serious nor lengthy, have been made, the tour will be resumed. Meanwhile, Mr. Blackburn, having spent longer than he intended on the Brussels demonstration and expecting that other delays would probably be involved at each demonstration place, decided to continue his journey to Athens by rail so as to arrive there on Sunday, October 11, in accordance with his original arrangement.

An Echo of the Past

HERR GUSTAV LILIENTHAL, brother of Herr Otto Lilienthal, is still continuing his experiments with flapping-wing aircraft. On a recent visit to Berlin we were able to examine his latest product, which is shown here. It is made from paper, string, fabric and bent bamboo, while an ancient motor moves the wings up and down. Like the ideas of so many great inventors, it is treated as a joke, but this in no way troubles Herr Gustav, who goes steadily on with his " bird," and may one day, we hope, confound all his critics.

Coming " Pollar " Flights

IT is anticipated that aircraft will play an important part in the forthcoming General Election, not only for transporting candidates and speakers over wide areas in the minimum of time, but for bringing outlying electors to and from the poll. In the latter connection, for instance, Mr. O. E. Simmonds—who will be remembered as originator of the Simmonds-Spartan aircraft and founder of the Hampshire Aeroplane Club—is standing as National Unionist candidate for the Duddeston Division of Birmingham, and is anxious to obtain as many aeroplanes as possible for the conveyance of electors to Birmingham on polling day, October 27. Pilots who are willing to help in this connection are asked to communicate with Mr. Simmonds' agent, Mr. S. G. Vangton, 97, Aston Street, Birmingham. Machines—which, it should be noted, must not be those usually flown for hire on reward—will be stationed at Castle Bromwich, and those offering machines need not be apprehensive that their time will be wasted with " nothing to do," as they will be notified beforehand whether or not their services will definitely be accepted. Helpers who can spare cars are also required. Should Mr. Simmonds be successful in winning his seat for this Division, it is his intention to look after the technical side of aviation matters as well as the light aeroplane clubs, etc. Another organisation which is already doing good work for the National Party with its aircraft is that which Miss Delia Crossley and Mrs. Dorys Bentley have charge of at Heston Air Port, London. Here are gathered 15 private owners of aeroplanes, who are ready to take candidates or literature or anything which is required to any part of the country at short notice, when by so doing they will be furthering the National Party's cause. They have been besieged with requests for their services, and Mrs. Bentley will be glad to hear of any more private owners who wish to help. She has an office at Heston (phone Hayes 410), and is there from early morning until late at night.

The Honeymoon Flyers

MR. AND MRS. C. H. DAY, who left Heston on May 31 for a honeymoon air tour to the East, left Hong Kong on October 9 for Amoy.

The R.E.P. Rocket

MR. ROBERT ESNAULT-PELTERIE was injured, and had two fingers blown away, by the premature explosion of a rocket which he hoped would be able to reach the moon.

Aircraft Apprentices

THE Air Council have granted to the British National Cadet Association the privilege, formerly exercised by the County Territorial Cadet Associations, of nominating candidates for entry as aircraft apprentices in the Royal Air Force. The necessary amendment to the appropriate regulations (Air Ministry Pamphlet 15) will be made in due course.

Gustav Lilienthal's flapping wing machine.

THE ROYAL AIR FORCE

London Gazette, October 6, 1931.

General Duties Branch

Air Commodore A. W. Bigsworth, C.M.G., D.S.O., A.F.C., is appointed Director of Equipment, Air Ministry, vice Air Vice-Marshal R. H. Clark-Hall, C.M.G., D.S.O. (October 1).

The follg. are granted permanent commns. as Pilot Officers with effect from September 26, and with seny. of the dates stated :—Pilot Officer J. N. Jefferson (R.A.F.O.) (September 26, 1930) ; Flying Officer J. G. G. Moore (R.A.F.O.) (September 26, 1930) ; W. Richards (March 26, 1930) ; Second-Lieut. A. M. Rodgers (R.A., T.A.) (September 26, 1930) ; Pilot Officer A. H. Seymour-Lucas (R.A.F.O.) (March 26, 1930).

The follg. are granted temp. comms. as Flying Officers on attachment to the R.A.F. (September 20) :—Lieut., R.N., N. G. Rodney Crawford. Sub.-Lieuts., R.N.—M. Bruce, P. H. Havers, J. D. Hayes, M. Johnstone, A. B. Kay, R. A. B. Michell, I. R. Sarel, J. D. Stead. Mate, R.N.—E. W. Lawson.

Lieut. G. Willoughby, R.N., is re-attached to R.A.F., as Flying Officer with effect from September 1, and with seniority of January 12, 1925. The follg. Pilot Officers are promoted to rank of Flying Officer :—M. G. C. Chadwick (September 1) ; L. H. Anderson, W. A. A. Ashcroft, J. C. F. Peacock, W. A. J. Satchell, R. G. Wilde (September 14). The follg. are placed on retired list at their own request (October 1) :—Air Vice-Marshal Sir C. L. Lambe, K.C.B., C.M.G., D.S.O., Flying Officer A. F. Adams, D.F.C., Flying Officer G. J. Ross. Air-Commodore I. M. Bonham-Carter, C.B., O.B.E., is placed on retired list on account of ill-health (October 1). The short service commn. of Pilot Officer on probation B. C. Pocock is terminated on cessation of duty (October 7).

Stores Branch

Sqdn.-Ldr. G. F. Law, O.B.E., is placed on retired list on account of ill-health (October 1).

Medical Branch

Flight-Lieut. J. D. Leahy, M.C., M.B., B.Ch., is promoted to rank of Sqdn.-Ldr. (October 6). The follg. Flying Officers are promoted to rank of Flight-Lieut. (October 1) :—C. G. Harold, M.B., B.Ch. ; A. Sheehan, M.B., B.Ch. ; J. J. Corcoran, M.B., B.Ch. ; A. H. Barzilay, M.B., Ch.B. Flight-Lieut. J. L. Groom, M.R.C.S., L.R.C.P., is transferred to Reserve, Class D (ii) (October 2).

Memorandum

The permission granted to Second-Lieut. L. Joslin to retain his rank is withdrawn on his enlistment in the Territorial Army (August 10).

PRINCESS MARY'S ROYAL AIR FORCE NURSING SERVICE

The notification in the *Gazette*, August 14, concerning Sister Miss H. W. Cargill is cancelled.

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

F. U. Hollins is granted a commn. in Class AA(ii) as Pilot Officer on probation (September 15). The follg. Flying Officers are transferred from Class C to Class A : B. R. Rolfe (September 12) ; G. S. Brown (August 26).

Flight-Lieut. J. T. Vernon is transferred from Class C to Class B (Stores Branch) (September 16) ; Flight-Lieut. R. A. Seaton is transferred from Class A to Class C (September 1) ; Flying Officer J. W. Pease relinquishes his commn. on appointment to a commn. in the Indian Army (September 23). The follg. relinquish their commns. on appointment to permanent commns. in the R.A.F. (September 26) :—Flying Officer J. G. G. Moore, Pilot Officer A. H. Seymour-Lucas, Pilot Officer J. N. Jefferson. Pilot Officer J. Simpson relinquishes his commn. on completion of service (June 26).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Air Vice-Marshal R. H. Clark-Hall, C.M.G., D.S.O., to H.Q., Coastal Area, on appointment as Air Officer Commanding, 1.10.31.

Air Commodore A. W. Bigsworth, C.M.G., D.S.O., A.F.C., to Air Ministry (A.M.S.R.), on appointment as Director of Equipment, 1.10.31.

Group Captain. I. G. V. Fowler, A.F.C., to Station H.Q., Amman, Palestine, pending taking over command, 26.9.31.

Wing Commanders : R. H. Kershaw, to No. 23 Group H.Q., Grantham, for Engineer Staff duties, 29.9.31. G. B. A. Baker, M.C., to R.A.F. Depot, Uxbridge, on transfer to Home Estabt., 14.9.31. R. F. S. Morton, to Station H.Q., Hinaidi, Iraq pending taking over command, 26.9.31. F. J. Linnell, O.B.E., to R.A.F. Base, Malta, pending taking over command, 26.9.31.

Squadron Leaders : A. L. Fiddament, D.F.C., to R.A.F. Depot, Uxbridge, 21.9.31. T. F. W. Thompson, D.F.C., to R.A.F. Depot, Uxbridge, 7.9.31.

Flight Lieutenants : T. O. Clogstoun, to No. 502 (Ulster) Sqdn., Aldergrove, 23.9.31. A. J. Brister, D.F.C., to R.A.F. Reception Depot, West Drayton, 24.9.31. W. L. Bateman, to No. 23 Sqdn., Kenley, 16.9.31. L. T. Keens, to No. 4 Sqdn., S. Farnborough, 28.9.31. J. C. M. Hay, to Station H.Q., Hal Far, Malta 26.9.31. W. H. Poole, A.F.C., M.M., to No. 47 Sqdn., Khartoum, 19.9.31. F. K. Damant, D.F.C., to No. 4 Flying Training School, Abu Sueir, Egypt, 26.9.31. L. Martin, to H.Q., Iraq Command. Hinaidi, 26.9.31. J. D. I. Hardman, D.F.C., to No. 216 Sqdn., Heliopolis, 26.9.31. N.W.F. Mason, to No. 30 Sqdn., Mosul, Iraq, 26.9.31. J. A. L. Hughes, to No. 28 Sqdn., Ambala, India, 8.9.31. I. Hodgson, to Aircraft Depot, Hinaidi, Iraq, 26.9.31. A. H. Harrison, D.S.M., to R.A.F. Base, Malta, 26.9.31. R. D. Starley, M.C., to No. 24 Sqdn., Northolt, 29.9.31. J. G. Western M.B.E., to H.Q., Inland Area, Stanmore, 1.10.31. H. A. Haines, D.F.C., to No. 2 Sqdn., Manston, 28.9.31. W. H. Jinman, M.B.E., to Marine Aircraft Experimental Estabt., 1.10.31.

Flying Officers : C. E. Chilton, to No. 209 Sqdn., Mount Batten, 28.9.31. M. Griffiths, to Sup. of R.A.F. Reserve, Hendon, 24.9.31. H. Broadhurst, to No. 41 Sqdn., Northolt, 16.9.31. L. McHardy, to No. 504 Sqdn., Nottingham, 23.9.31. H. F. Chester, to No. 84 Sqdn., Shaibah, Iraq, 26.9.31. E. V. N. Bramley, to No. 14 Sqdn., Palestine, 26.9.31. L. F. H. Orr to No. 40 Sqdn., Upper Heyford, 1.10.21. N. C. Singer, to No. 600 Sqdn., Hendon, 24.9.31.

Pilot Officers : J. C. Larking, to No. 12 Sqdn., Netheravon, 28.8.31. H. Pilling, to No. 1 Sqdn., Tangmere, 26.9.31. W. I. Clarke, to No. 3 Sqdn., Upavon, 26.9.31. F. R. Newell and J. A. B. Begg, to No. 7 Sqdn., Worthy Down, 26.9.31. D. G. W. Somerville, to No. 9 Sqdn., Boscombe Down, 26.9.31. J. A. C. Forbes and R. H. Preller, to No. 17 Sqdn., Upavon, 26.9.31. E. Foster, to No. 19 Sqdn., Duxford, 26.9.31. D. G. Singleton and N. A. Ireland, to No. 23 Sqdn., Kenley, 26.9.31. L. J. Neale, to No. 32 Sqdn., Kenley, 26.9.31. W. M. Hargreaves, to No. 35 Sqdn., Bircham Newton, 26.9.31. F. G. L. Smith and W. H. Husbands, to No. 41 Sqdn., Northolt, 26.9.31. W. J. Hickey, to No. 43 Sqdn., Tangmere, 26.9.31. A. L. Christian and A. A. Adams, to No. 54 Sqdn., Hornchurch, 26.9.31. I. C. Bird, to No. 56 Sqdn., North Weald, 26.9.31. J. A. Dobson and R. A. Phillips, to No. 58 Sqdn., Worthy Down, 26.9.31. G. R. Canavan, to No. 99 Sqdn., Upper Heyford, 26.9.31. G. W. P. Grant, to No. 111 Sqdn., Hornchurch, 26.9.31. R. H. Harris, to No. 207 Sqdn., Bircham Newton, 26.9.31. J. J. Murphy and J. G. Younghusband, to No. 2 Sqdn., Manston, 26.9.31. D. W. Morrish, to No. 16 Sqdn., Old Sarum, 26.9.31. The undermentioned are all posted to No. 5 Flying Training School, Sealand, with effect from 26.9.31 :—G. Atkinson, J. W. Donaldson, J. Grandy, M. A. Lunnon, L. F. J. Taylor, G. A. Bartlett, M. H. Dwyer, J. H. Heyworth, L. W. Oliver, L. M. B. Vickers, W. E. Cameron, D. Y. Feeny, J. G. de V. Hunt, A. A. Saw, R. B. Young, R. L. Crossman, J. Goodhart, P. A. Hunter, W. L. Stewart, and J. F. L. Zorn.

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IN PARLIAMENT

Indian Air Force

SIR S. HOARE, on October 5, in reply to Major Pole, said the Government of India are now promoting a Bill to facilitate the establishment and to provide for the administration and discipline of the Indian Air Force. As regards other measures, six Indian cadets are now under training at Cranwell with a view to qualifying for commissions in that Force, and further vacancies are being offered. Steps are being taken in India to provide and train the subordinate personnel.

Imperial Airways, Limited

MR. VIANT, on October 6, asked the Under-Secretary of State for Air the sum representing the relief from Petrol Duty granted to Imperial Airways, Limited, for each financial year since the tax was imposed ; and if this relief has applied to the company's inland air services, joy riding, or flights to sports meetings ?

Maj. Elliot : No special relief has been granted to Imperial Airways. The law provides for a drawback of duty where oil is shipped on aircraft proceeding on foreign journeys. This applies not only to Imperial Airways but to aircraft generally, and it merely follows the ordinary practice under which stores are shipped free of duty on ships proceeding on foreign voyages.

Mr. Viant also asked what is the approximate cost to the State on account of subsidy for each ton mile operated by Imperial Airways, Limited, for the financial years ended April, 1929, 1930 and 1931, in respect of provincial services, European services, Eastern services, and African services, respectively :

Sir P. Sassoon : The figures for cost of subsidy per ton-mile for the European and Eastern services are given below. The African service did not start until March last. No Government subsidy was paid in respect of provincial services.

	European Services.	Eastern Services.
	£ s. d.	£ s. d.
1928-29	0 3 9	1 1 8
1929-30	0 3 4	0 12 11
1930-31	0 4 2	0 14 5

Aircraft Insurance and Third Party Risks

LIEUT.-COLONEL SIR GODFREY DALRYMPLE-WHITE, on October 7, asked the Under-Secretary of State for Air if his attention had been called to the dangerously low flying of certain aircraft over villages ; and whether consideration has been given to compulsory insurance against third-party risks, such as is the case with motor vehicles, for both private and Royal Air Force aircraft.

Sir Philip Sassoon : Occasional complaints of the kind referred to have been received, although none are of very recent date. The question of compulsory insurance against third-party risks in respect of civil aircraft is under active consideration by an international committee of jurists, on which this country is represented, in connection with the preparation of an international convention as to liability for damage caused by aircraft to third parties on the ground. Any damage by Royal Air Force aircraft would be dealt with under the ordinary procedure for cases of claims for compensation against the Crown.

Imperial Airways, Limited

MR. VIANT asked (1) what subsidy was actually earned by Imperial Airways, Limited, during the financial years 1929-30 and 1930-31 ; what amounts were earned by each service for each of those years ; and what unearned subsidy was held by Imperial Airways, Limited, at the end of the financial years 1929-30 and 1930-31 in respect of each service ; (2) what sums were actually paid to Imperial Airways, Limited, in respect of subsidies during the financial years 1929-30 and 1930-31 ; for what particular services were they paid ; and what amount was paid for each service for each of these years.

Sir P. Sassoon : The following table gives the information required :

	Subsidy, 1929-30		Subsidy, 1930-31	
	Earned	Paid	Earned	Paid
European	£125,000	£125,000	£125,000	£125,000
England-Egypt	£88,750	£80,000	£95,565	£98,750
Egypt-India	£110,000	£94,200	£110,000	£110,000
African*	—	—	£8,000	£40,000

* £32,000 unearned balance held. This service only commenced in March 1931, and the figure of £32,000 represents the balance of the advance of £40,000 provided for in the agreement.

THE INDUSTRY

The Salmson Triumph

THE first British Salmson aero engine has just passed its type test. This is the A.D. 9, which is the English version of the little 9-cylinder Salmson which we have seen over here flying in the Monospar and several Klemm machines. It is now fitted with dual ignition, and passed the type test rated at 48/54 h.p. with normal revs. of 2,100 and maximum revs. of 2,300. This is a particularly praiseworthy effort, as it is the first engine to pass the type test since the regulations have been modified, for now nine hours of the last ten-hour period have to be run on full throttle as a form of detonating test. This little engine has already given exceptional satisfaction in England, and, now that it is a British product, we hope that it will be even more widely used. For the growing class of private owners who do not make a fetish of top speed, but wish to have an economical aeroplane such as the Comper Swift, although in this case they get the top speed as well, or, for example, a Klemm, the 50-h.p. Salmson is undoubtedly the right engine.

Parker Pen Publicity " Puss Moth "

MR. A. F. D'YDEWALLE has just returned to Heston Airport after completing a European tour of 30,000 miles in the " Puss Moth " aeroplane purchased from Brian Lewis & Co., Ltd., by The Parker Pen Co. Decorated by Airwork Ltd. with a giant representation of a fountain pen on each side of the fuselage, this machine has during the last month visited the following places:—Amsterdam, Hanover, Berlin, Dresden, Königsberg, Danzig, Kovno, Warsaw, Czernowitz, Cecuit, Bucharest, Burgas, Constantinople, Sofia, Budapest, Zagreb, Vienna, Munich, Prague, Brunn, Zurich, Berne, Lausanne, Geneva, Basle, Paris, Brussels, Antwerp and Ostend. Mr. d'Ydewalle, who is incidentally believed to be the first Englishman to carry out an extensive commercial tour of this kind, states that it has been signally successful, and that in almost every town he visited he obtained valuable free publicity from the Press.

Redwing Sales

THE Redwing Aircraft Co., of Stafford Road, Croydon, Surrey, have now organised their sales depôts in preparation for a big push next year. Flt. Lt. Russell, sales manager, has now taken up his residence at Colchester, and from the Blue Barns Aerodrome will look after the whole area north of London. Mr. Payne has been stationed at Salisbury and will care for the area south of London from High Post Aerodrome. The Redwing Co. realise that service is the most important part of selling any particular article, and of aircraft in particular. They have, therefore, at both of these stations, men who are ready to go out on any Redwing job at any time of the day or night, whatever the weather. In a similar way the factory and head office at Croydon will service the London area, at which place Mr. Pike is in charge. All Redwing owners have been given a 'phone number which they can call up at any hour of the day or night, and arrangements are such that when possible spares or a mechanic are immediately flown to wherever they are required. Should it be at night, or when the weather does not permit of flying, then motor cycles will be utilised for this purpose. The Redwing is certainly already finding a niche in British aviation, for the Scarborough Club, the Eastern Counties Aeroplane Club, the Wiltshire Light Aeroplane Club and the L.G.O.C. Club all use Redwings, while the number of private owners having these machines is growing steadily. The machine itself is admirable for club flying, since both its easy controllability and low landing speed make it just the machine for people to learn on, while the sociability of its side-by-side seating is a great attraction to the private owner.

Rustproofing

THE problem of adequate protection from rust and corrosion is one of prime importance to the aircraft manufacturer, and, in fact, to all those whose products are used in or on aircraft. A system which has been found successful in a large number of cases, and which is used for the protection of many parts, is " Parkerising." This process, patented by the Pyrene Co., Ltd., of the Great West Road, Brentford, Middlesex, is a system whereby iron and steel parts can have the surface converted into an insoluble phosphate which is impervious to rust under all ordinary conditions. The process is simple and the plant required by no means costly. It is only necessary to clean the metal, immerse in the Parkerising solution, which is made by dissolving Parco Powder in boiling water, and finally finish by the application of oil or any other recognised finish. An advantage of this process is that rapid movement of the parts is unnecessary, slowly turning them over while being submerged for 60 min. being quite sufficient. No careful control of the solution strength is required, and the whole process may therefore be operated by unskilled labour. Of particular interest to aircraft manufacturers is the fact that Parkerising in no way affects shape, temper, magnetism or the physical properties of the metal, nor is there any growth, so that fine limits are not impaired.

PUBLICATIONS RECEIVED

Henson and Stringfellow: Their Work in Aeronautics. By M. J. B. Davy, A.F.R.Ae.S., Board of Education, Science Museum. London: H.M. Stationery Office, W.C.2. Price 5s. net.

Report of the Director of the North-West Territories and Yukon Branch, 1929-30. Department of the Interior, Ottawa, Canada.

The Secret Squadron. By Laurence La Tourette Driggs. London: John Hamilton, Ltd. Price 7s. 6d. net.

A Manual of Rigging for Aircraft. 1931. *Air Publication,* 1107. London: H.M. Stationery Office, W.C.2. Price 4s. 6d. net.

The Air Annual of the British Empire, 1931-32. Edited by Squadron-Leader C. G. Burge. Aldershot and London: Gale & Polden, Ltd. Price 21s. net.

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AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations*: Cyl. = cylinder; i.c. = internal combustion; m. = motors. The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

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18,502. P. H. LINDLEY. Apparatus for signalling and other display purposes for use on aircraft. (357,183).
18,893. J. G. NAVARRO and M. A. NAVARRO. Aeroplanes, etc. (357,247).
19,224. H. R. RICARDO. Starting of i.c. engines of the compression-ignition type. (357,262).
25,383. J. PINTSCH AKT.-GES. Beacon lights for air traffic. (357,351).
29,966. R. S. STEPHEN. Aerial navigating compasses. (357,386).

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6,473. FIAT SOC. ANON. Landing-gear for aeroplanes. (357,476).

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